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**INCONTINENCE AFTER CHILDBIRTH AND**  
**THE EFFECT ON FEMALE SEXUALITY AND QUALITY OF LIFE**

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**Thesis submitted in accordance with the requirements of**  
**The University of Liverpool for**  
**The degree of Doctor of Philosophy**

**by**

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**(RGN, RM, BSc, MA, PGCert.)**

**August 2007**

**Chester University & Wirral University Teaching Hospital NHS Foundation Trust.**

## **ABSTRACT**

### **INCONTINENCE AFTER CHILDBIRTH AND THE EFFECT ON FEMALE SEXUALITY AND QUALITY OF LIFE**

#### **Objectives**

To determine obstetric, maternal and fetal variables that increase the risk of postnatal urinary and anal incontinence. To establish how anal and urinary incontinence impact on Quality of Life (QoL) with particular reference to sexual psychology. Finally, to ascertain the extent of disclosure of incontinence problems to partners and health professionals.

#### **Design**

A longitudinal, prospective, repeated measures, cohort study using five data sources. Data was collected in the last trimester of pregnancy, at 6 weeks postnatal, 6 months postnatal and finally at one year postnatal.

#### **Setting**

Wirral University Teaching Hospital NHS Foundation Trust.

#### **Participants**

Primiparous women with no pre-existing disease (N=516). Participants were recruited after a normal 20 week obstetric ultrasound scan.

#### **Results**

Stress incontinence was reported by 39.7% antenatally, 28.2% at 6 weeks postnatal, 31% at 6 months and 26.5% at one year postnatal. Urge incontinence was reported by 23.5% antenatally, 21.2% at 6 weeks, 21.4% at 6 months and 16.4% at one year postnatal. Anal incontinence at one year postnatal was reported by 9.39%. Those participants under the age of 20yrs had higher rates of postnatal urge incontinence ( $p<.001$ ) possibly associated with increased rates of infection in this group. BMI>30 was associated with higher rates of antenatal stress incontinence but was not significant in the postnatal period. BMI<20 was associated with an increase in postnatal urge incontinence. Prolonged periods of time in labour without bladder emptying was associated with increased rates of both urinary incontinence (OR 2.36) and anal incontinence ( $p=.026$ ). Forceps delivery was associated with postnatal stress incontinence (OR 2.41). Although caesarean section appeared protective against urinary incontinence initially, long-term data show a progressive increase in reported rates of urinary incontinence even after elective caesarean section. Elective caesarean section was protective for anal incontinence. Faecal incontinence was significantly higher (OR 3.26) in the group who had their labour induced (12.1%) compared to those who had a spontaneous labour (4.6%). Perineal trauma was not associated with anal incontinence. However, it was associated with urinary incontinence throughout the postnatal year with anal sphincter disruption having the highest rates of stress incontinence ( $p<.005$ ).

Birth weight, duration of labour, feeding method, epidural anaesthesia and smoking were not significant. Overall, urinary incontinence appears to be a regressive condition, although the impact on QoL is cumulative and seems to increase over time. Some participants had a progressive, deteriorating condition which appears to be associated with a higher BMI or >6 hours from bladder emptying to delivery of the baby.

Urinary and anal incontinence had a detrimental effect on all QoL domains. Those reporting nocturnal enuresis, pain, intercourse incontinence and urge incontinence were effected the most. The greatest impact is on the emotion domain. Only 8.7% with urinary incontinence and 9.7% with anal incontinence discussed their symptoms with a health professional. Discussion with a partner was 32.8% and 21.4% respectively. The most common reasons for non-disclosure were embarrassment, fear of not being taken seriously and not wanting to waste the time of the health professional. Those participants who did disclose tended to have multiple symptoms.

Pregnancy and childbirth appear to have a detrimental impact on sexual psychology, irrespective of continence status. Those who reported incontinence appear to have less sexual depression than the continent group suggesting the adoption of defense mechanisms to preserve the sexual Self.

## **Conclusion**

Generally, urinary incontinence is a regressive condition. Risk factors for a progressive condition have been identified. Younger pregnant women appear to be more prone to infection which can sensitise the bladder and result in long term urinary incontinence. Prolonged periods of time in labour without voiding increases the risk of urinary and anal incontinence and is associated with a deterioration of symptoms over time. Whilst for all other modes of delivery the rate of UI decreased over time, in the elective CS group, the rate of UI increased steadily throughout the postnatal year. These findings support previous studies and suggest a degree of under-recognition or under-reporting of anal sphincter trauma leading to dysfunction. The impact of incontinence on quality of life domains shows clear evidence that the condition has a detrimental impact on many aspects of an individuals well being. Those women reporting intercourse incontinence had the greatest impact on QoL domains. Few women seek help for their condition and a number of personal and organisational factors have been highlighted which contribute to keeping incontinence both secret and taboo. It is clear that what incontinent women *think* is affecting the way they *feel* and ultimately their *behaviour*. Psychological defence mechanisms are employed to justify their inaction.



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## **CHAPTER 1 INTRODUCTION**

### **1.1 INTRODUCTION**

Childbirth results in changes in the role and obligations a woman and her partner have within society and also within their personal relationship. Social factors such as relationship status, social class, education, support, and external pressures can all have an impact on the psychological health of the woman. This combines with physical and biological factors such as a tendency to depressive illness, altered body image, tiredness, physiological changes and emotional fluctuations. The result can lead to total upheaval in daily routine, possible neglect of personal needs, reduced self-esteem and relationship difficulties.

Pregnancy and childbirth lead to many physical changes, some of which are temporary whilst others may be more permanent. In particular, there is a significant morbidity risk for incontinence. Prevalence rates for postnatal urinary incontinence vary considerably and have been identified as ranging from as low as 2.8%<sup>1</sup> to as high as 77%.<sup>2,3</sup> Disparity also exists in the prevalence rates for anal and faecal incontinence. Rates for faecal incontinence have been reported to be as low as 0.6%<sup>4</sup> and as high as 22%.<sup>5</sup>

A comprehensive, evaluative literature review of incontinence in relation to childbirth is included in Chapter Two. Several maternal and fetal factors have been identified as possibly contributing to the risk of developing postnatal anal and urinary incontinence. These include parity, maternal weight, duration of labour, fetal weight, perineal trauma, method of delivery, smoking, ethnicity and maternal age.

However, many studies into these potential risk factors, present contradictory conclusions. As such, there is an absence of consensus amongst professionals as to the causative relationship between obstetric variables and continence status. This is compounded by the lack of standardised, validated definitions and assessment tools to measure incontinence. In addition, women often choose not to disclose the continence

problems they are experiencing. This is possibly due to embarrassment, self blame, and a belief that it is normal, or associated stigma. As such, incontinence remains a "taboo" subject for many women. This concealment has cultivated a lack of acknowledgement and understanding amongst many health professionals and the public. The advertising of sanitary products aimed at women with incontinence may aid the "normalising" of the condition. This in turn could reduce the stigma and prompt a more open discussion. However, if incontinence is portrayed as normal then the woman may accept her situation and not ask for professional advice. Consequently, the condition will remain under-reported.

The impact that incontinence may have on physical activities and life style has been well documented.<sup>6-10</sup> These include a preoccupation with the location of toilets, restricting fluid intake and reducing mobility and exercise. Similarly, effects on social activities have been explored.<sup>6;11;12</sup> Those affected are often reluctant to discuss their situation and might avoid circumstances that could lead to disclosure. Social events may be avoided. In extreme cases, absence from work and isolation can result.

Whilst some studies have identified an adverse effect of incontinence on sexual function,<sup>13-17</sup> highlighting problems such as dyspareunia, sexual difficulty, sexual depression and negative sexual emotions, research deficits have been identified. These include a lack of awareness of the biological factors that may influence continence status, neglect of male partners and their perspective, validity and reliability of data collection and assessment tools and finally the reductionist approach to the study of sexuality. In many studies, this has led to sexuality being measured solely by the frequency of sexual activity and sexual intercourse.<sup>18</sup>

The term sexuality is ambiguous. Whilst sexuality is generally seen to be connected with sex, this too is complicated. Sex can be used to describe anatomical features that determine us as either male or female (to be a sex). It can also refer to intercourse (to have sex). Sexuality has also been used to describe sexual preferences, but the definition reaches far beyond biology. It is a component of personality and as such pervades how we present ourselves, body language, self-perception and social interaction. Sexuality is therefore a personal and a social phenomenon. The



phenomenon of sexuality is contextual, varying with culture and time. As such, individual sexuality is reliant on the political, social and personal circumstances at a particular point in time. Sexuality is concerned with far more than sexual activity. It involves processes of psychology, including interpersonal and intra-personal communication. Central to this are self-image and self-esteem. In turn, this may influence sexual preoccupation and desire. The sexual self is a cognitive generalization derived from experience, which influences belief and guides behaviour. The development of the self, and in turn, a sexual self is explored in Chapter two.

Societal and religious approaches to sexuality throughout history have fostered the connotations and taboos often associated with it. Social convention had prohibited the discussion of sexuality, and religious convention detailed what was “normal.” Everything outside of this prescription was seen as sinful. Making sexuality sinful did not make it disappear. However, it did encourage any discussion to be secretive and fostered conjecture on the subject. This approach has contributed to knowledge deficits.

Reliable and valid research into aspects of sexuality is relatively sparse. This study will aim to combine the two taboos outlined above, incontinence and sexuality, and explore the inter-relationship between them within the context of childbirth.

## **1.2 RESEARCH PROBLEMS, QUESTIONS, VARIABLES, HYPOTHESES, NULL HYPOTHESES**

### **1.2.1 THE PROBLEM ADDRESSED IN THIS RESEARCH IS**

**What are the obstetric, maternal and fetal factors that increase the risk of postnatal urinary and anal incontinence and how do these conditions affect female sexuality and quality of life? Do women seek help when continence problems exist?**

### **1.2.2 KEY VARIABLES**

- Incontinence: the degree of urinary and anal incontinence

- Sexuality: sexual esteem, sexual depression and sexual preoccupation
- Quality of Life: quality of life domain scores for personal/relationship, role, social, physical, emotion and sleep/energy domains; plus a general health perception, incontinence impact score and severity score.
- Obstetric information: duration of labour, mode of delivery, perineal trauma, interventions and analgesia.
- Maternal and fetal information: Body Mass Index, fetal weight, social variable, breast feeding, smoking.

### 1.2.3 RESEARCH QUESTIONS

- i. What is the prevalence of postnatal urinary incontinence?
- ii. What is the prevalence of postnatal anal incontinence?
- iii. Are there any obstetric, maternal or fetal variables that will influence the prevalence rates and degree of urinary and anal incontinence postnatally?
- iv. What is the impact of incontinence on quality of life?
- v. What are the relationships between urinary incontinence and female sexual esteem, sexual preoccupation and sexual depression?
- vi. What are the relationships between anal incontinence and female sexual esteem, sexual preoccupation and sexual depression?
- vii. Do continence problems impact on intimate relationships?
- viii. Do women discuss continence problems with health professionals? If so, how do they perceive their experiences?

### 1.2.4 HYPOTHESES

- i. There is a positive relationship between childbirth and incontinence of urine as measured by the Kings Health Questionnaire.<sup>19</sup>
- ii. There is a positive relationship between childbirth and anal incontinence as measured by the Manchester Health Questionnaire.<sup>20</sup>
- iii. There are identifiable obstetric, fetal or social factors that contribute to the risk of anal and urinary incontinence. These include: age, BMI, birth weight, duration of labour, bladder emptying in labour, mode of delivery, feeding

method, induction of labour, epidural anaesthesia, smoking and perineal trauma.

- iv. Incontinence has a detrimental impact on quality of life as measured by both the Kings Health<sup>19</sup> and Manchester Questionnaires.<sup>20</sup>
- v. Urinary incontinence as measured by the Kings Health Questionnaire<sup>19</sup> has an adverse effect on female sexuality measured using the Sexuality Scale.<sup>21</sup>
- vi. Anal incontinence as measured by the Manchester Health Questionnaire<sup>20</sup> has an adverse effect on female sexuality measured using the Sexuality Scale.<sup>21</sup>
- vii. Incontinence has an adverse impact on intimate relationships as measured on the relationship domain of the Kings Health and Manchester questionnaires, free text responses and the Sexuality Scale.
- viii. Women do not discuss continence or sexuality problems with health professionals.

#### 1.2.5 NULL HYPOTHESES

- i. Childbirth is not associated with urinary incontinence, as measured by the Kings Health Questionnaire.<sup>19</sup>
- ii. Childbirth is not associated with anal incontinence, as measured by the Manchester Health Questionnaire.<sup>20</sup>
- iii. There are no identifiable obstetric, fetal or social risk factors for anal or urinary incontinence
- iv. Urinary or anal incontinence does not adversely affect quality of life domain scores, as measured by both the Kings Health<sup>19</sup> and Manchester questionnaires.<sup>20</sup>
- v. There is no significant difference in reported sexuality problems, as measured by the Sexuality Scale,<sup>21</sup> between women who are continent and those who are incontinent of urine as measured by the Kings Health Questionnaire.<sup>19</sup>
- vi. There is no significant difference in reported sexuality problems, as measured by the Sexuality Scale,<sup>21</sup> between women who are continent and those who have anal incontinence as measured by the Manchester Health Questionnaire.<sup>20</sup>
- vii. Continence problems do not have an adverse impact on intimate relationships.

- viii. Women who have concerns about their continence will access health care and seek help for their problem. When help is sought from health care professionals, the advice received is perceived as helpful and appropriate.

### **1.3 JUSTIFICATION FOR THE RESEARCH**

In the United Kingdom, in the year 2000, a total of 598,580 babies were born. Allowing for multiple births, this still means that approximately 500,000 women were pregnant, proceeding to a registered birth. Given the prevalence figures described above, even with conservative estimates this suggests that large numbers of women every year will become incontinent as a consequence of childbirth.

The financial cost and the long-term health implications are important considerations. However, the cost to the social and psychological well being of the woman, her partner and ultimately her family, present a wider concern.

This research will not explore the physiological and neurological processes associated with pregnancy and childbirth. However, it will aim to:

- i. Identify the prevalence of urinary incontinence in the last trimester of pregnancy and at several stages throughout the postnatal period, up to one year.
- ii. Identify the prevalence of anal incontinence one year postnatally.
- iii. Identify the impact that urinary incontinence has on female sexuality. By examining the impact that incontinence can have on the sexuality of the woman affected, this research will aim to provide women, their partners and professionals with information in order that they may understand the nature of this condition more fully.
- iv. Identify the impact that anal incontinence has on female sexuality.
- v. Identify any maternal, fetal and obstetric factors that may predispose a woman to develop urinary and/or anal incontinence; in particular, identifying those factors associated with obstetric and midwifery practice. Previous research has presented contradictory conclusions. The possible reasons for this and how this research will hope to overcome them will be explored in Chapter

Two. Armed with this knowledge, health care providers can offer appropriate advice and care. The identification of practices that may contribute to the development of incontinence could thus reduce morbidity.

- vi. Discover if urinary and anal incontinence is reported to health professionals and if not, why not. Once the barriers to accessing health care are identified, access to appropriate support, advice and treatment can be addressed.

This research will focus solely on the woman and her perception of her sexuality. The feelings of her partner will not be evaluated here.

## **1.4 DESIGN AND METHOD**

Chapter Three will include a detailed account of the design and method used for this research and will include an explanation of the research tools used.

### **1.4.1 RESEARCH TOOLS**

Quantitative research relies on instruments to collect data. These instruments need to be reliable, sensitive and valid. The process of ensuring reliability and validity involves rigorous psychometric testing. Essentially, reliability is concerned with consistency and accuracy of measurement. Validity is concerned with the ability of the instrument to do what it has been designed to do; to actually measure what you set out to. Sensitivity is concerned with measuring the size of the effect or change.

#### **1.4.1.1 Incontinence symptoms**

The assessment of urinary incontinence will be undertaken using the Kings Health Questionnaire.<sup>19</sup> This is a validated tool used to assess urinary incontinence and its impact on quality of life. Respondents are given a graduated score calculated from their replies. The higher score is associated with the more severe condition.

Anal incontinence will be assessed using the Manchester Health Questionnaire.<sup>20</sup> This tool is based on the same principles as the Kings tool, but has been adapted and validated for anal incontinence.

### **1.4.1.2 Sexuality**

Sexuality will be explored using the Sexuality Scale,<sup>22</sup> devised by Dr. W. E. Snell. Again, this is a validated tool used to identify sexual esteem, sexual depression and sexual preoccupation. Respondents receive a score for each of the three components: sexual esteem, sexual preoccupation and sexual depression. Normative data will be collected from nulliparous, continent controls. In addition, the continent group will be used to provide baseline scores for this population. The impact of pregnancy on sexuality can be assessed by comparison to normative data. The impact of incontinence on sexuality will be assessed by comparison between the continent and incontinent groups.

## **1.4.2 SECONDARY DATA**

### **1.4.2.1 Symptom reporting**

The letter accompanying the anal incontinence questionnaire will ask patients if they have sought medical help for their condition and provide a free text section for them to give an account of their experience. Those who have not sought help will be asked to indicate any reasons why not.

### **1.4.2.2 Maternal, fetal and obstetric factors**

Some basic physical and social characteristics will be obtained using a self-report questionnaire. For example, any previous history of urinary problems, medical conditions affecting bladder or bowel function, perception of severity of any bladder problems, breast or bottle feeding, maternal weight, smoking and relationship status, will be covered. This will accompany each of the urinary and anal questionnaires. Intrapartum and delivery data will be obtained from maternity case notes and recorded on a proforma. Information will include demographic and obstetric details.

## **1.4.3 METHOD**

In order to reduce obstetric and social variables, this research will only recruit women who have no previous children and are not suffering from any medical condition that

may predispose them to continence problems. The patients who plan to have their obstetric care provided by a specific District General Hospital Maternity Unit, over a period of one year, will be invited to take part. Information leaflets explaining the research were issued to eligible patients following confirmation of a normal routine ultrasound scan at 20 weeks gestation.

The Kings Health and Sexuality Scale questionnaires will be posted at approximately 30 weeks gestation, 6 weeks postnatally, 6 months postnatally and finally at one year postnatally. In addition, at one year, the Manchester questionnaire will be posted together with the questions regarding disclosure and help-seeking behaviour. This will provide prevalence data on the long-term rate of anal incontinence and will also aim to discover how many patients sought treatment, where they went, if the treatment worked, what influenced their decision to seek professional advice; or if they have not sought advice, why not and what would have helped them

Given that the same questionnaire is given to the same patients, on four occasions over a period of 18 months, it may also be possible to determine if incontinence is progressive, getting worse, or regressive, getting better. Furthermore, when combined with delivery details, it may lead to the identification of obstetric interventions or events that increase the risk of urinary and faecal incontinence postnatally. Comparisons will be made between the continent and incontinent group to examine the effect of incontinence on female sexuality. In particular, the measurement of sexual esteem, sexual preoccupation and sexual depression.

A qualitative approach using interviews might have provided greater depth in exploring the complex interface between incontinence and sexuality. However, it was felt that the large number of participants required for statistical analysis prohibited this method. Furthermore, discussing such sensitive subjects face to face with the researcher, with the possibility of a crying baby present, may lead to embarrassment for the woman and reluctance to engage in open discussion. In addition, securing private time to discuss these subjects at the various points in time could have proved problematic.

The method of this research will be to present a series of quantitative self reported data on symptoms, attitudes, belief and behaviour over a period of time. This will combine with further quantitative data concerning obstetric details. The scores given to respondents following completion of the incontinence and sexuality assessment scales will be compared for correlation.

#### 1.4.4 SAMPLE SIZE

As long term prevalence data for urinary and faecal incontinence remains controversial, the number of patients required for statistical analysis is difficult to calculate. Furthermore, due to the conceptual reductionism in the majority of research equating sexuality to sexual activity, the long term influence of childbirth on female sexuality remains unknown. In order to maintain validity, the sample selected needs to be representative of the study population as a whole, and the research tools need to be applied to those groups they were intended to be used for. The research will thus aim to recruit all women having their first baby during the course of one year.

In 2001, there were 3,078 live births at the hospital where the research will be undertaken; 1,337 of these were to first time mothers and so possibly eligible for inclusion in the research. After exclusions, it is estimated that 1 thousand women will be invited to take part, and be involved in the research for a period of approximately a year and a half.

Whilst the research is only being conducted in one geographical area, it is expected that the results on incontinence prevalence and contributory factors could be applied to any society where similar obstetric and midwifery practices take place within a comparable demographic population.

As stated above, the phenomenon of sexuality varies with culture and time, being reliant on the political, social and personal circumstances at a particular point in time. As such, the results from this research could not be extrapolated to other societies and will be relevant to a specific culture at a given point in time. However, the information obtained will provide general insight into sexuality and the impact that certain life events can have upon it.



### 1.4.5 EXCLUSIONS

The following patients will be excluded from the research:

- Patients who have had a baby previously.
  - Patients who experience an intra-uterine fetal death or stillbirth.
  - Patients who have a medical condition or disability that may affect their continence state.
  - Any pre-existing bladder or bowel problem.
- Patients who have a significant fetal abnormality identified at the routine 20 week ultrasound scan or later.
- Severe maternal illness requiring intensive care.

### 1.4.6 SUMMARY OF METHOD

First time mothers are recruited and given incontinence and sexuality questionnaire at approximately 30 weeks gestation.

These questionnaires are repeated postnatally 6 weeks, 6 months and finally a year after the baby has been born.

Also at one year, all those who have participated will be sent a questionnaire to ascertain symptoms of anal incontinence. They will also be asked about their interaction with health professionals and partners regarding any continence problems.

The researcher will collate the incontinence and sexuality data, and combine it with demographic and obstetric information, in order to address the research questions identified above.

## **1.5 OUTLINE OF THIS THESIS**

### Abstract

The abstract will encapsulate the aim and method of the investigation and present a summary of the results achieved.

### Chapter One: Introduction

The introductory chapter will outline the background and present a brief overview of current literature in relation to childbirth and incontinence. The chapter will proceed by identifying the research questions, variables, hypotheses and null hypotheses. The need for research into this area and the possible impact on clinical practice will be explained. A brief summary of the design and method will be presented. Finally, the format of this thesis will be outlined.

### Chapter Two: Literature review

Chapter Two will provide an evaluative literature review on childbirth and incontinence. Deficits in previous studies will be highlighted. The chapter will proceed to introduce the concept of the self to include development of a sexual self. On this basis, an evaluative literature review on the effect of incontinence on sexuality will be presented.

### Chapter Three: Design and method.

Chapter Three will provide a detailed account of the research design and method. This will include a justification for the research tools used. Variables and correlates will be explained in greater detail. Finally, a consideration of ethical issues will be offered.

### Chapter Four: Results

Chapter Four will address the implementation of the study. Response rate and characteristics of those who did reply will be evaluated. The prevalence rates for urinary incontinence in the last trimester of pregnancy and throughout the postnatal period, up to one year, will be presented. Anal incontinence rates at one year postnatally will also be given. Any identifiable personal or obstetric factors influencing the prevalence of incontinence will be fully discussed.

Having identified the continent and incontinent comparison groups, the chapter will continue by evaluating the effect that incontinence has on female sexuality. Finally, the chapter will present data gathered on disclosure of continence problems to health professionals.

### Chapter Five: Discussion

Chapter Five will begin with an over-view of the study. Each of the main research findings will be discussed in the light of existing knowledge and theories. The validity and generalisation of results will be addressed. The research methodology will be evaluated. Recommendations for future research will be made. Finally, the research hypotheses will be revisited and conclusions drawn.

## **1.6 DELIMITATIONS OF SCOPE AND KEY ASSUMPTIONS**

Childbirth in itself is likely to have a profound impact on sexuality. Many physical factors such as breast-feeding, mode of delivery, surgery, pain and weight gain may be present. These will combine with psychological factors, for example satisfaction, depression and anxiety. Finally, social factors such as housing, finance, relationships, and support will coalesce to have an overall impact on sexual esteem, sexual depression and sexual preoccupation.

This research will aim to recruit large numbers of women and ask them the same set of questions over four different time frames. This data should provide prevalence information for urinary incontinence during the last trimester of pregnancy, the early postnatal period, 6 months after delivery and a year after delivery. It will also identify the long-term prevalence of anal and faecal incontinence. In order to identify the effect that incontinence has on sexuality, the responses from the continent group will be compared to those from the incontinent group.

The individual contribution to sexuality or incontinence of the physical, psychological or social categories outlined above will not be addressed. By recruiting large numbers of women over this time frame, it is assumed that those factors that may impact on sexuality will be reflected within and be comparable between, both the continent and incontinent group. However, certain specific characteristics as detailed in the research tools above will be identifiable. These factors are thought to be pertinent to the recognition of risk factors for incontinence.

The research will only be undertaken in one geographical area. Whilst the community contains a wide spectrum of clientele in terms of social class and education, there is a limited ethnic population.

The current research deficit exploring the perception and experiences of partners following the birth of a baby will not be addressed by this research.

## **1.7 CONCLUSION**

This chapter has laid the foundation for the research. Following a brief summary of literature and background information, it has introduced the research problem, the questions and the hypotheses. The research has been explained and justified. Design and method have been briefly introduced, the structure of the report identified and limitations clearly acknowledged. On these foundations, the report will proceed with an evaluation of current literature in relation to childbirth and incontinence.

## **CHAPTER 2 LITERATURE REVIEW**

A search of MEDLINE and PUBMED electronic databases was carried out. This was further supplemented by a search of the Cochrane Library and Google Scholar. In addition, a detailed hand search of relevant books and journals was completed. Databases were searched using the following headings: urinary incontinence, anal incontinence, faecal incontinence, smoking, obesity, BMI, age, ethnicity, race, diet, physical activity, duration of labour, mode of delivery, parity, anal sphincter trauma, disclosure, help seeking, sexuality, sexual psychology, sexual esteem, sexual depression and sexual preoccupation.

### **2.1 INTRODUCTION**

Urinary and anal incontinence are complex problems resulting from many different causes and for which numerous approaches to treatment exist.<sup>23</sup> The impact of incontinence may include physical, psychological and social aspects which influence the quality of life of the individual concerned. Aspects of quality of life include functional, social, cultural, subjective and socio-psychological variables that impact on role performance, independent living and perceived well-being.<sup>24</sup>

Pregnancy and childbirth are established risk factors for the development of urinary and anal incontinence. However, the precise identification of more specific potential risks is less conclusive. Data from different studies present conflicting information, possibly due to inconsistency of definitions, study design and population variables. Prevalence studies are difficult to compare and incidence studies are few.<sup>25</sup>

The anatomy and physiology involved in the maintenance of urinary and anal continence, childbirth and sexual activity share common structures. As such, the processes may be mutually dependent and inter-related. It follows that the consequences of incontinence for the individual may impact upon not only their generic quality of life, but more specifically, their sexual quality of life.

This chapter will focus on causes and consequences of incontinence within the sphere of childbirth. The definitions, prevalence, risk factors and impact on quality of life of both urinary and anal incontinence will be summarised. The chapter will continue by introducing the concept of the “self” before moving on to explore the sexual self within cognitive, affective and behavioural contexts. The inter-relationship between pregnancy and childbirth, incontinence and sexuality will then be outlined. Although an apparently common problem, few women seek help for their incontinence. The current evidence concerning help-seeking behaviour will be reviewed.

## 2.2 URINARY INCONTINENCE

Urinary incontinence encompasses a wide range of symptoms that may differ in frequency and severity. A combination of symptoms, signs and urodynamic investigations may be used to categorise urinary incontinence. Surveys based on questionnaires and interviews will only record symptoms. The pathophysiology that underlies these symptoms has not yet been established. This requires urodynamic investigation. Symptoms and urodynamic investigation give rise to the classification of urinary incontinence into various types (stress incontinence and urge incontinence). These types are further classified in terms of severity (frequency and quantity).

### 2.2.1 DEFINITIONS AND CLASSIFICATIONS

The International Continence Society (ICS) previously defined incontinence as: *“Involuntary loss of urine which is objectively demonstrable and a social or hygienic problem.”*<sup>26</sup> This definition may be problematic for both researchers and the individual who has the problem. The implication is that incontinence does not exist unless it can be independently measured and verified. As such, the personal report of the patient experience is negated.

Recently, the ICS has issued new guidance on terminology and definitions.<sup>27</sup> In this new classification, urinary incontinence is defined as *“any involuntary leakage of urine”* and lower urinary tract symptoms (LUTS) are divided into storage symptoms, voiding symptoms and post micturition symptoms. Signs suggestive of lower urinary tract dysfunction (LUTD) are also classified and are concerned with the frequency,

severity and impact of LUTS. Urodynamic observations are also classified. The definitions pertinent to this research are included below (Table 2.1).

Classification	Symptoms and Functionality
STORAGE SYMPTOMS	
Stress Urinary incontinence (SUI)	The involuntary loss of urine on effort or exertion or on sneezing or coughing.
Urge Urinary Incontinence	Involuntary urine leakage accompanied by or immediately proceeded by urgency.
Mixed Urinary Incontinence	Involuntary urine leakage associated with urgency and also with exertion, effort, sneezing or coughing.
Nocturnal enuresis	Loss of urine occurring during sleep.
LUTD SIGNS	
	This section will include observation of the symptoms above.
URODYNAMICS	
Detrusor Over activity (DO)	Urodynamic observation characterised by involuntary detrusor contractions during bladder filling which may be spontaneous or provoked. This may lead to incontinence (DOI). This term replaces the term Detrusor Instability (DI)
Urodynamic stress incontinence (USI)	The involuntary loss of urine resulting from an increase in intra-abdominal pressure, which overcomes the resistance of the bladder outlet in the absence of a true bladder contraction. This term replaces the term Genuine Stress Incontinence (GSI)

Table 2.1: Classification of incontinence by symptoms

This changing of definition and terminology leads to difficulties when reporting and comparing previous studies. Throughout this text, the terminology employed by the author of the research quoted is used.

In women, GSI and DI (now termed USI and DO) are the two most commonly recognised clinical disorders of the lower urinary tract.<sup>28</sup> Incontinence can also be associated with some medical conditions, certain drugs, congenital abnormality, and social and mobility problems. In developing countries, fistulae leading to continence difficulties may follow a prolonged labour or problems during childbirth.

### 2.2.2 PREVALENCE OF URINARY INCONTINENCE

Epidemiological studies of urinary incontinence are sparse and methodologies varied. This is combined with a lack of consensus on definitions among investigators. Consequently, information on prevalence rates is conflicting.<sup>29</sup> Variation between studies into prevalence rates may also be associated with differing study populations, ethnicity and perceived acceptability of the condition. Incontinence is likely to be under-reported; therefore, higher prevalence figures are more likely to be accurate.<sup>30</sup> Most aetiological studies have been in mixed age groups and have failed to differentiate incontinence types.<sup>28</sup>

Some epidemiological studies have been conducted on specific groups, races, age groups and categories of the population. Data collected is usually self-reported by women and relies on personal accounts of frequency, amounts of urine lost and effects on life style rather than clinical parameters. As this research will only investigate first time mothers, published prevalence rates for this group are outlined below. Firstly, prevalence for women of childbearing age who have had no children (nulliparous) is presented, stratified by age. This is followed by a summary of prevalence studies for first time mothers, during the antenatal and postnatal periods.

#### **2.2.2.1 Prevalence of urinary incontinence amongst nulliparous women of child-bearing age**

The prevalence of a disease is calculated by taking the total number of cases divided by the number of people at risk. As such, it is usually expressed as the number of cases per thousand or hundred thousand. Incidence refers to new cases occurring at a particular point in time divided by the number of the population at risk. Although it may be expressed as cases per thousand it is more often expressed as a percentage.<sup>31</sup> Studies investigating urinary incontinence have employed both of these methods to measure the frequency with which the condition occurs.

In one of the largest studies to date<sup>32</sup> including 15,307 women under the age of 65 years, 3,339 women were nulliparous. Of these, 10.1% reported some degree of urinary incontinence. The authors go on to subdivide this group by age and type of incontinence. The results are summarised in Table 2.2.



	No incontinence	Any incontinence	Moderate or severe incontinence	Stress incontinence	Urge incontinence	Mixed type incontinence
20-29yrs (n=2,134)	92.10%	7.9% (n=168)	2.8% (n=59)	3.1% (n=67)	1.5% (n=32)	2.5% (n=53)
30-39yrs (n=448)	91.50%	8.5% (n=38)	2.5% (n=11)	4.2% (n=19)	0.4% (n=2)	3.3% (n=15)
40-49yrs (n=363)	80.20%	19.8% (n=72)	9.4% (n=34)	9.4% (n=34)	2.8% (n=10)	6.6% (n=24)

Table 2.2: Prevalence of incontinence by age (nulliparous women)

This data suggests that there is an underlying prevalence of incontinence in a young healthy population, independent of pregnancy.

2.2.2.2 Prevalence and incidence during pregnancy

The impact of pregnancy on the lower urinary tract is unclear. Current knowledge is based on animal models with human studies offering contradictory results. During pregnancy, numerous hormonal, structural and physiological changes take place which impact upon the urinary system. Consequently, urinary tract infections, frequency of micturition and incontinence are common. Antenatal incontinence is believed to be largely transient and attributable to increase in glomerular filtration rate, hormonal changes, enlargement of the uterus, temporary changes in the urethrovesical angle and softening of ligaments and muscles secondary to the action of an increase in the levels of the hormone Relaxin.

Accurate prevalence or incidence rates for incontinence during the antenatal period are difficult to ascertain due to varying methods of data collection, definitions used and reluctance of many women to disclose their symptoms. In addition, some studies group together nulliparous and multiparous women, whilst others treat these groups separately. Urinary incontinence in pregnancy increases with increasing gestation<sup>25</sup> and this too can impact upon the comparability of studies. Prevalence rates have been reported as low as 3.5%<sup>33</sup> and as high as 77%.<sup>2</sup> Table 2.3 shows antenatal urinary incontinence rates for a nulliparous population during pregnancy.

Author	Year	Sample size	Method	Antenatal urinary incontinence
Chaliah <sup>34</sup>	2000	286	Urodynamic assessment at 34 weeks gestation	GSI 9% prevalence DI 8% prevalence
Dimpfl <sup>35</sup>	1992	290	Primigravida all vaginal delivery. Questioned about retrospective symptoms	Stress incontinence 54% incidence
Dolan <sup>36</sup>	2003	96	Symptom recording plus pelvic floor neurophysiology	Stress incontinence 54.6% prevalence Urge incontinence 34.6% prevalence (Based on replies from 55 women)
Dolan <sup>37</sup>	2004	492	Questionnaire at 34 weeks gestation	Urinary incontinence 35.6%
Meyer <sup>38</sup>	1998	149	Questionnaire and urodynamic assessment	Stress incontinence 31%
Sampselle <sup>2</sup>	1996	53	Questionnaires from 20 weeks gestation	Stress incontinence 77% prevalence
Scarpa <sup>39</sup>	2006	96	Questionnaire in third trimester of pregnancy	Stress incontinence 45.5%
Umlauf <sup>40</sup>	1995	300	Retrospective questionnaire 10 weeks postpartum	Incontinence during the antenatal period 43% incidence
Van Brummen <sup>33</sup>	2006	344	Questionnaire at 12 weeks and 36 weeks gestation	Wet overactive bladder 3.5% at 12 weeks gestation 14.6% at 36 weeks gestation
Viktrup <sup>41</sup>	1992	305	Interview during pregnancy	Any incontinence 32% incidence in pregnancy Stress incontinence 29% incidence in pregnancy Urge incontinence 10% incidence in pregnancy
Wijma <sup>42</sup>	2001	117	Questionnaire, pad test and serial ultrasound of the perineum	35% reported urinary incontinence during pregnancy. 20% had positive pad test (4% in non-pregnant controls) Serial ultrasound showed dynamic characteristics of connective tissue in pelvic floor do not alter. However, a significant decrease in pelvic muscle contraction occurs No relation with urethra-vesical junction

Table 2.3: Antenatal urinary incontinence

### 2.2.2.3 Prevalence during the postnatal period

As in the antenatal period, accurate postnatal data are difficult to collect. Incontinence during the initial few weeks after delivery is transient and often destined to subside as hormonal and pressure effects resolve. Longer term, at one year, symptoms are likely to be caused by pathological factors associated with pregnancy, labour and delivery.

The variation in rates may be indicative of the problems associated with such research. One study demonstrating a very low reported rate of urinary incontinence at one year (2.8%)<sup>1</sup> only looked for "new onset" of urinary incontinence, thus excluding those who had antenatal incontinence. Additionally, incontinence was defined as urine loss on at least two occasions. These factors may have contributed to the reduced reported rate. In contrast, Mason<sup>43</sup> at one year reports prevalence as high as 37%. However, this was only from a sample of women who had experienced symptoms at 8 weeks postpartum.

Several studies include both primigravida and multigravida women in the same sample. Some long term studies<sup>25;36;44;45</sup> include women who go on to have further pregnancies during the study period. The time period at which data is collected can also vary considerably. Thus selection criteria, definitions and exclusions can markedly impact upon reported prevalence rates. Table 2.4 summarises recorded prevalence rates in the postnatal period for first time mothers.

Follow up periods range from 2 weeks to 15 years. Most researchers have employed a self report questionnaire method. Within the first postnatal year, rates of urinary incontinence range from 2.8%<sup>1</sup> to 77%.<sup>2</sup>

Author	Year	Actual sample	Method	Follow-up postnatally	Prevalence of Urinary Incontinence
Arya <sup>1</sup>	2001	315 in total n=90 forceps n=75 vacuum n=150 normal	Excluded women with antenatal incontinence  Telephone interview at 2 weeks, 3 months and 1 year after delivery	2 weeks	12.2-13.3% prevalence. Vacuum delivery and normal delivery had highest prevalence
				3 months	7-15.9% prevalence. Forceps delivery had highest prevalence
				1 year	2.8-11% prevalence. Forceps delivery had highest prevalence
Chaliah <sup>34</sup>	2000	286	Urodynamic assessment	3 months postnatal	Stress incontinence 5% prevalence Detrusor instability 7% prevalence
Clarkson <sup>46</sup>	2001	470	Questionnaire	6 weeks, 9 months and 14 months	Urinary Incontinence 35% prevalence

Dolan <sup>36</sup>	2003	76	Symptom recording plus pelvic floor neurophysiology	7yrs	Stress incontinence 38.9% prevalence If no further pregnancy  60.3% prevalence if repeat pregnancy
		55	Symptom recording plus pelvic floor neurophysiology	15yrs	Stress incontinence 41.6% If no further pregnancy  53.5% if repeat pregnancy
Dolan <sup>37</sup>	2004	492	Questionnaire	305 days postnatal and 3 months postnatal	Urinary incontinence 13%
Farrell <sup>47</sup>	2001	595	Questionnaire	6 weeks and 6 months	Urinary incontinence 26% incidence
Glazener <sup>48</sup>	2006	3405	Questionnaire	3 months	29% urinary incontinence
Meyer <sup>38</sup>	1998	149	Questionnaire and urodynamic assessment	9 weeks post delivery	Urinary incontinence prevalence: 36% following forceps 21% normal vaginal delivery
Sampsel <sup>2</sup>	1996	53	Questionnaire	1 year	Stress incontinence 77% prevalence
Umlauf <sup>40</sup>	1995	300	Questionnaire	8 months	Any incontinence 13% prevalence
Van Brummen <sup>49</sup>	2007	344	Questionnaires	3 months 12 months	Vaginal delivery – SUI 33.9% at 3 months and 40.5% at 12 months  Caesarean delivery – SUI 7.5% at 3 months and 21.7% at one year.
Viktrup <sup>25</sup>	2002	278	Questionnaire	5yrs	Stress incontinence 30% prevalence Urge incontinence 15% prevalence

Table 2.4: Prevalence rates of postnatal urinary incontinence in first time mothers

As stated above, in contrast to the antenatal period, persistent postnatal urinary incontinence is often attributed to pathophysiological changes consequential to labour and delivery. In addition to trauma to the bladder, urethra and supporting structures; denervation of the pelvic floor and perineal muscle injury are thought to directly contribute to postnatal urinary incontinence.

## 2.3 ANAL INCONTINENCE

Anal and faecal incontinence is a socially disabling condition. In the younger age categories, it is more common in women, and incidence is at a peak in the elderly.<sup>50</sup> The true incidence in the general population or amongst specific groups is probably vastly underestimated. This is largely due to embarrassment. Patients are often unwilling to discuss their condition with family, friends or health professionals. This can present barriers for diagnosis, treatment and research. The vast majority of patients who do seek professional help for faecal incontinence are women who have suffered an obstetric injury, often giving a history of prolonged labour or traumatic vaginal delivery.<sup>50</sup> This section will firstly offer definitions for faecal and anal incontinence. Prevalence data is then presented focusing specifically on those studies that identify rates for non-pregnant or first time mothers.

### 2.3.1 DEFINITIONS AND CLASSIFICATIONS

Anal incontinence generally refers to involuntary loss of gas and/or faeces.<sup>51</sup> Faecal Incontinence is the involuntary loss of faeces and is often accompanied by a degree of urgency. Continence relies on a combination of internal and external anal sphincter competence, intact pelvic floor musculature, adequate rectal capacitance and compliance, intact neural pathways and intact cognition and social awareness to provide conscious control. The complicated physiologic phenomenon is not completely understood.<sup>52</sup>

### 2.3.2 PREVALENCE OF ANAL INCONTINENCE

Prevalence of anal incontinence amongst women varies between 1% and 21%.<sup>53;54</sup> As with urinary incontinence, this variation in reported prevalence is possibly associated with difference in definition and variables within the cohorts studied.

The estimated community prevalence for faecal incontinence is 1.7 per thousand women aged 15-64 years,<sup>55</sup> but its prevalence has not been fully assessed in younger age groups.<sup>56</sup> Unlike urinary incontinence, there is evidence that overall, men are affected more than women, being 1.3 times more likely to experience faecal incontinence.<sup>54</sup> A large, American, community based postal survey, collated faecal

incontinence data on 3536 women of various ages. The overall population based faecal incontinence prevalence was 7.7%, with prevalence increasing markedly in the older age groups.<sup>57</sup>

Faecal incontinence may coexist with other conditions, such as gynaecological complaints. Of 566 women attending a gynaecology clinic between the ages of 18 and 64 years, anal incontinence affected 28.4%. Specifically, 25.6% reported incontinence of flatus, 6.8% incontinence of mucous, 12.9% incontinence of liquid faeces and 13.1% solid faeces. The prevalence of combined urinary and anal incontinence was 9.9%.<sup>53</sup> However, these women were already seeking help for an intimate, potentially embarrassing condition, and this may have influenced their predisposition to disclose. Furthermore, comorbidity of gynaecological and incontinence conditions has not been assessed to determine their inter-relationship.

Faecal incontinence can coexist with urinary incontinence and in a study by Khullar, 15% of patients attending a urodynamic clinic declared faecal incontinence when questioned directly.<sup>58</sup> The rate rose to 26% amongst the same women when a questionnaire was used. In another study, symptomatic faecal incontinence occurred in 21% of women presenting with urinary incontinence, pelvic-organ prolapse, or both.<sup>59</sup>

### **2.3.2.1 Prevalence of anal incontinence amongst nulliparous women of child-bearing age**

Conclusive anal and faecal incontinence prevalence data for non-pregnant, healthy women of childbearing age is not currently available. Alnaif studied 222 nulligravid teenage girls and found that 3% reported faecal incontinence. Being over-weight was a significant contributory factor ( $p=0.0152$ ).<sup>60</sup>

### **2.3.2.2 Prevalence and incidence during pregnancy**

A study based in Switzerland,<sup>59</sup> reported a prevalence rate of anal incontinence amongst antenatal women as 6.7%. Only one study provides comprehensive data specific to primiparous women,<sup>61</sup> recording defecatory symptoms. With a sample size of 487 at 12 weeks gestation, 34.6% reported anal incontinence and 3.9% reported

faecal incontinence. In the same study, at 36 weeks gestation, the sample size was 400 and reported rates of anal and faecal incontinence were 42.3% and 3% respectively.

2.3.2.3 Prevalence during the postnatal period

In adult females, obstetric trauma is often cited as the most common cause of faecal incontinence.<sup>62;63</sup> As with urinary incontinence, the presence of symptoms does not correlate well with diagnostic measures. Some patients with evidence of muscular or nerve damage will not experience symptoms and some with symptoms; will not have evidence of damage.<sup>64</sup>

The prevalence of postnatal anal or faecal incontinence varies greatly. As with studies looking at urinary symptoms, there are problems with definition, method, classification and sample selection. The Table below (table 2.5) summarises current knowledge on postnatal prevalence. Seven studies look specifically at first time mothers. Five of these studies report rates for anal incontinence, which vary considerably with findings of 4%-14.3% in the first 3 months postpartum.<sup>4;38</sup> Higher rates were recorded by studies utilising longer term follow up; with 22%-30.5% reporting anal incontinence at one year postnatal.<sup>5;61</sup>

Faecal incontinence is reported by five of the studies and recorded as ranging from 0.6%<sup>4</sup> to 4%<sup>46</sup> by most studies with one markedly different result of 22% recorded by Fynes.<sup>5</sup> The sample size in the Fynes study was considerably smaller than others and this may impacted upon the results.

Author	Year	Sample size	Method	Postnatal anal/faecal incontinence
Clarkson <sup>46</sup>	2001	1,036 primips 9-14 months after delivery	Questionnaire	4% faecal incontinence
Eason <sup>65</sup>	2002	949 women, three months postnatal	Questionnaire	3.1% Faecal incontinence 25.5% anal incontinence
Fynes <sup>5</sup>	1999	59 nulliparous women	Questionnaire and clinical examination	22% faecal incontinence one year after first delivery
Groutz <sup>66</sup>	1999	300 142 primips and 158 multips at 3 months and	Telephone Interview.	<u>3 months</u> 7% had anal incontinence (9% of the primips had anal incontinence)

		one year postnatally		
Guisse <sup>67</sup>	2007	8,774 postnatal women	Questionnaire	29% Anal incontinence 13.5% Faecal incontinence
Hall <sup>68</sup>	2003	50 women, 6 weeks postnatal	Questionnaire	24% anal incontinence, 10% faecal incontinence
Kalis <sup>4</sup>	2003	160 primiparous women. Few days after delivery, 2 months and 6-9 months	Questionnaire	<u>At 2 months</u> Faecal incontinence 0.6% anal incontinence 14.3% <u>6-9 months</u> Faecal incontinence 0.6% 10.4% anal incontinence
MacArthur <sup>69</sup>	2001	7,879 Women in UK and New Zealand, 3 months after delivery	Questionnaire	Faecal incontinence 9.6%
MacArthur <sup>70</sup>	2005	4,214 women 6yrs after delivery	Questionnaire	Persistent faecal incontinence 3.6%
Mellier <sup>71</sup>	1990	265 patients immediately postnatal	Direct questioning	Anal incontinence 26.7%
Meyer <sup>38</sup>	1998	149 nulliparous women, 9 weeks after delivery	Questionnaire, history, examination	Anal incontinence: 5.5% after normal delivery 4% after forceps
Ryhammer <sup>72</sup>	1995	304 women without anal sphincter tears	Questionnaire	Anal incontinence 1.2% after first delivery
Sultan <sup>73</sup>	1993	150 women 6 weeks post delivery leading to 32 with abnormal symptoms being re-examined at 6 months	Symptomology and anal ultrasound	13% primigravida and 23% multigravida had anal or faecal incontinence 6 weeks after delivery. No change at 6 months
Van Brummen <sup>61</sup>	2006	407 primigravida at 12 months postpartum	Questionnaire	3.3% Faecal incontinence 30.5% Anal incontinence
Wilson <sup>74</sup>	1996	1,505 women 3 months post delivery	Questionnaire	4.9% faecal incontinence
Zetterstrom <sup>75</sup>	1999	349 nulliparous women only, 5 months and 9 months after delivery	Questionnaire	<u>5 months</u> 25% anal incontinence 2% faecal incontinence <u>9 months</u> 26% anal incontinence 1% faecal incontinence

Table 2.5: Postnatal anal and faecal incontinence



## 2.4 RISK FACTORS IN RELATION TO URINARY AND ANAL INCONTINENCE

Various lifestyle and obstetric factors may be influential in the development or resolution of urinary and faecal incontinence. Most studies into lifestyle factors and urinary incontinence report associations but do not explore the impact and effect of the condition on behaviour. What follows is a summary of the current available literature in relation to various social and obstetric risk factors. Firstly, pre-existing and social factors are considered.

### 2.4.1 PRE-EXISTING AND SOCIAL FACTORS

Some pre-existing and social risk factors for urinary and anal incontinence have been identified. However, in many studies the results are contradictory. This section will review the literature in relation to smoking, body mass index, age, ethnicity, diet and physical activity.

#### **2.4.1.1 Smoking**

General population: Although some studies have found no statistically significant association between smoking and urinary incontinence in the general population,<sup>76-79</sup> other studies have found a correlation (Table 2.6).<sup>80-86</sup> One reason for this discrepancy may be a lack of consideration of the total exposure to smoking in terms of quantity and duration. As such, the studies are not comparable. Case control studies have considered this dosing effect and found that incontinence symptoms were related to cigarette exposure.<sup>80-82;86</sup> An increased prevalence of incontinence symptoms amongst smokers has been attributed to greater frequency and severity of coughing. It is thought that coughing leads to anatomical and pressure transmission defects resulting in GSI.<sup>84</sup> This is despite evidence suggesting that smokers have stronger urethral sphincters.<sup>87</sup> In addition, cigarettes have been shown to reduce oestrogen and impair collagen synthesis.<sup>80</sup> The effect of smoking on incontinence does not appear to decrease after smoking cessation.<sup>82</sup> There is no conclusive evidence to support a link between smoking and anal incontinence although nicotine is known to stimulate distal colonic motility and may exacerbate faecal urgency.<sup>88</sup> However, one recent large scale population based study conducted by Guise and involving 8774 women found an

association between smoking and severe faecal incontinence.<sup>67</sup> Further research is required into this possible link.

**Pregnant population:** There are few studies investigating smoking, incontinence and pregnancy. The limited data available remains inconclusive.

Author	Year	Sample Size	Sample selection	Findings
Bump <sup>80</sup>	1992	322	Women incontinent of urine	The data establish a strong statistical relationship between current and former cigarette smoking and stress incontinence (p = .000009)
		284	Continent controls	
Burgio <sup>89</sup>	2003	523	Women interviewed at various times up to one year postnatally	Postpartum incontinence was significantly related to smoking (p=.007)
Dallosso <sup>81</sup>	2003	7,046	Women aged over 40yrs	Smoking is associated with the onset of stress incontinence and overactive bladder
Hannestad <sup>82</sup>	2003	27,936	Women over 20yrs from the general population	Current smoking of more than 20 per day increases risk of incontinence (OR 3.0)
Kristiansson <sup>76</sup>	2001	200	Women in early pregnancy	Smoking is not associated with stress incontinence
Miller <sup>83</sup>	2003	500	Incontinent women	Smoking significantly increased the severity of incontinence
Persson <sup>78</sup>	2000	10,074	Women who had surgery for urinary incontinence	Smoking was not associated with surgery for stress incontinence (OR 0.89)
Richter <sup>90</sup>	2005	650	Women with SUI admitted for surgery for urinary incontinence	Current smokers had 56% more incontinence episodes than non-smokers (p=.0002)
Samuelsson <sup>85</sup>	2000	487	Women 20-59yrs from general population	Smoking increases the risk of urinary incontinence (OR 1.9 times)
Schmidbauer <sup>79</sup>	2001	2,500	Men and women taking part in a health screening programme	Smoking is not statistically associated with urinary incontinence
Tampakoudis <sup>86</sup>	1995	80	Incontinent women	Significantly more smokers were incontinent p<.0005
		80	Controls	
Teleman <sup>77</sup>	2004	1,500	Incontinent women	Urinary symptoms were not associated with smoking
		1,500	Controls	

Table 2.6: The relationship between smoking and urinary incontinence

### 2.4.1.2 Body Mass Index

It is thought that the additional weight associated with obesity, as with pregnancy, can cause chronic straining, stretching and weakening of pelvic musculature, nerves and structures. This in turn, may lead to the development of urinary or anal incontinence.

General population: Studies exploring the relative risk of obesity and the development of urinary incontinence present contradictory results. A high Body Mass Index (BMI) or clinical obesity has been shown to significantly increase the risk of developing urinary incontinence by numerous large studies.<sup>77;79;82;83;90-95</sup> However, two studies disagree.<sup>80;96</sup>

The situation is complicated further when the work of Bai is considered.<sup>97</sup> In a case control study of 98 women with stress urinary incontinence and 102 continent women of similar age, all patients with SUI underwent urodynamic investigations. The study concluded that BMI was significantly higher in women reporting SUI than in the control group ( $r = .131$ ). However, whilst obesity may be an important etiological factor for SUI, it did not actually influence urodynamic parameters. There was no relationship found between BMI and urodynamic parameters. The question thus remains, why are obese women incontinent if their urodynamic function is no different?

There is minimal evidence on the association between anal incontinence and obesity or raised BMI. Studies which have been done have primarily focused on children, the elderly or patients with a coexisting disease. Large population based studies have found association between raised BMI and faecal incontinence<sup>57;67;98</sup> but these patients were often in older age groups with a high degree of comorbidity. In a cohort looking specifically at gynaecology patients, increased BMI was a predictor for anal incontinence (OR 1.04; 95% CI 1.01-1.08).<sup>53</sup>

Pregnant population: Raised BMI has been related to an increased risk of developing urinary incontinence in a pregnant or postnatal population by several studies ( $p=.0001-.019$ ).<sup>89;99-101</sup> However, there is some disagreement in the literature with one study finding no association.<sup>39</sup> When the available evidence is considered as a whole,

evidence from large studies suggests that raised BMI is indeed a risk factor for the development of urinary incontinence.

One study reviewed obstetric patients 6 years after delivery for persistent faecal incontinence and found BMI was not statistically significant,<sup>70</sup> whilst a recent study by Nichols found that anal sphincter damage was more common in women with a low BMI.<sup>102</sup>

#### 2.4.1.3 Age

Although age in itself does not cause incontinence, several age related changes in the central nervous system, bladder, rectum and associated organs lead to an increased risk of incontinence. These are most apparent in later life and post-menopausal women. This research focuses on younger women of child bearing age. As with other potential risk factors for incontinence, there is contradictory evidence relating to the significance of age for this population.

General population: Several changes to urethral muscle have been demonstrated in relation to increasing age in general. These include a reduction in total muscle density,<sup>103</sup> fewer muscle fibres,<sup>104</sup> and a reduction in striated muscle.<sup>103</sup> It has been demonstrated that 2% of urethral muscle fibres are lost each year ( $p < .001$ ).<sup>104</sup> In addition, the function of the pudendal nerve has been shown to reduce as age increases, with Delta Pudendal Nerve Terminal Motor Latency (PNTML) increasing significantly ( $p = .0241$ ).<sup>105</sup> This decline in urethral striated muscle fibre, combined with a decrease in pudendal nerve function has been offered as an explanation for increasing rates of incontinence amongst older women.

Several studies have failed to demonstrate a significant relationship between urinary incontinence and age in a general population, the largest of which had a sample size of 606 in total.<sup>80</sup> However, other research findings contradict this. Several large scale, population based studies (largest sample size 2,500) have shown that increasing age is associated with an increase in the prevalence of urinary incontinence.<sup>79;85;96;106;107</sup>

As most women in this research will, by definition, fall within a narrow age band, it could be argued that age will not be a contributing factor in this study. Whilst it is certainly true that post-menopausal women are not included in this research, age remains a significant factor even in younger women. This is clearly evident in Table 2.2 where it can be seen that incontinence increases markedly as age advances.

Pregnant population: A summary of the evidence for age as a risk factor for incontinence in an obstetric population is outlined in Table 2.7. Of the five studies exploring age and urinary incontinence, four found no association <sup>72;76;89;99</sup> and one found that there was an association.<sup>108</sup> Further information can be obtained from population-based studies that have gathered retrospective data on previous obstetric history. Many studies have explored age as a continuous variable. However, when divided into incremental age groups, several population-based studies have found that women having their first child younger than 21 years or older than 35 years were more likely to develop urinary incontinence, particularly stress incontinence.<sup>95;109-111</sup> This bi-polar effect may go some way to explain non-significant results in other studies, where age has been used as a continuous variable.

Three obstetric studies in Table 2.7 examine anal and faecal incontinence. All found a significant correlation between advancing age and anal incontinence.

Author	Year	Sample Size	Sample selection	Findings
Burgio <sup>89</sup>	2003	523	Women followed up for one year postnatally.	Age was not associated with urinary incontinence
Chiarelli <sup>112</sup>	2003	568	High risk deliveries, one year postnatally	Maternal age was a significant factor in the development of faecal incontinence (P=.005)
Hojberg <sup>113</sup>	2000	7,557	Women attending for antenatal care	Age over 35yrs increased the risk of anal incontinence (OR1.6, 95%CI)
Kristionsson <sup>76</sup>	2001	200	Women in early pregnancy	Age was not a significant factor for the development of SUI
MacArthur <sup>69</sup>	2001	7,879	Women three months postnatally	Increased maternal age had a significant association with the development of faecal incontinence (p=.002 for 30-34 year age group)
Ryhammer <sup>72</sup>	1995	242	Women without anal sphincter tears	Maternal age was not significant in the development of urinary incontinence
Thomason <sup>99</sup>	2007	160	Primiparous women	Age was not associated with urinary incontinence (p=.9)
Van Brummen <sup>108</sup>	2006	344	Primiparous women in pregnancy and postnatal	Bothersome SUI was associated with greater maternal age (p=.04)

Table 2.7: The relationship between age and incontinence for obstetric studies

#### 2.4.1.4 Ethnicity

General population: 183 African American and 132 Caucasians referred to a urogynaecology clinic with symptoms of urinary incontinence and/or pelvic organ prolapse were included in a study to examine race as a predictive factor of urinary incontinence.<sup>114</sup> Urodynamic parameters were used to classify incontinence. Significant differences were found in the type of incontinence amongst the two different races ( $p=.001$ ). Caucasian race was the most significant predictor of GSI, (odds ratio 2.21), and African-American race was the only significant predictor of detrusor instability, or detrusor over activity as it is now termed (odds ratio 2.6). Recent research by Kingele<sup>115</sup> found comparable results. A similar study included all new patients referred to a urogynaecology clinic over a 10 year period.<sup>116</sup> Of these, 195 Hispanic, 95 white, 66 Asian and 59 African-American women had urodynamic testing and were included in the study. Again, African-American women were less likely to be diagnosed with GSI than were Hispanic or white women ( $p<.001$  and  $p=.046$ ). However, they were more likely to be diagnosed with DI than Hispanic, white or Asian women ( $p<.001$ ,  $p=.04$  and  $p=.04$  respectively). Hispanic, white and Asian women had similar rates of GSI. African women had much lower rates of GSI (USI) but significantly higher rates of detrusor instability than all three groups. More recently, a larger study has found similar conclusions.<sup>117</sup> A self-report questionnaire was completed by 799 black, 932 white and 639 Hispanic women attending a gynaecology clinic. Again, the prevalence of stress incontinence was higher amongst white women ( $p<.001$ ). Like previous studies, the urinary symptoms and incontinence classification between the groups was significantly different. Previous studies examining the significance of race in relation to urinary incontinence found that Black women who did have GSI were found to be significantly heavier, had a higher parity, more often took a diuretic, were more often diabetic and had greater urethral axis mobility than white women.<sup>118</sup>

All of the above studies have included women attending for gynaecological or urodynamic testing. Racial differences are difficult to quantify as cultural factors alter the perception and presentation of urinary complaints.<sup>30</sup> It may be that the decision to

seek such treatment varies between race and cultures and thus may have had some influence upon these results. One other possible explanation for these racial differences may be functional and morphological differences in the support structures of the urethra. Black women have demonstrated a 29% higher average urethral closure pressure during maximum pelvic muscle contraction ( $p=.008$ ) and a 36% increase in bladder neck mobility ( $p=.02$ )<sup>119</sup> There is no evidence to support a link between race and anal incontinence in the general population.

Pregnant population: There are few studies exploring race and pregnancy in relation to urinary incontinence. Whilst recent research by Burgio<sup>89</sup> found no association between race and postnatal urinary incontinence, the initial sample was 523 women, 82.4% of whom were white. As such, the sample size may have been inadequate to demonstrate a statistically significant association between urinary incontinence and race. There is no data available to determine the association between race and anal or faecal incontinence in a pregnant population. However, Macarthur has demonstrated that Asian women had an increased risk of their symptoms remaining problematic, long term.<sup>70</sup>

#### **2.4.1.5 Diet**

Evidence is emerging to support an association between diet and urinary incontinence. In a study exploring diet of 7,046 women, overactive bladder was associated with consumption of carbonated drinks, whilst consumption of chicken, bread and vegetables reduced the risk. Carbonated drinks also increased the risk of GSI, whilst again, bread consumption reduced the risk.<sup>81</sup> In another study<sup>82</sup> people who drink tea had a higher risk of developing urinary incontinence, whereas coffee and alcohol had no significant effect. There is evidence that caffeine stimulates both bladder and bowel in addition to having a diuretic effect.<sup>120</sup> The contribution that this has to incontinence symptoms is not conclusive.

Diet will impact on the characteristics of faecal material, such as bulk and consistency. This may impact on transit time, urgency, constipation and ease of defecation. Consequently, diet is an important factor to consider for those suffering from faecal incontinence.

### 2.4.1.6 Physical activity

Minimal stress incontinence during exercise is common and traumatic exercise may lead to the development of the condition.<sup>121</sup> One report found new onset SUI and pelvic floor defects following parachuting.<sup>122</sup>

### 2.4.2 PREGNANCY, LABOUR AND DELIVERY

Many of the social risk factors outlined above will already be present when pregnancy is considered. There is a paucity of research into the effects of normal pregnancy on the lower urinary tract, although it has long been recognised that pregnancy is associated with urinary symptoms and pelvic floor changes.<sup>123</sup> During pregnancy and delivery, the lower genitourinary tract undergoes profound changes as a result of hormonal and mechanical influences. The 25% increase in glomerular filtration rate and renal perfusion give rise to an increase in urine production. The decrease in production of anti-diuretic hormone adds to urine production even further.

Cystometry studies in pregnancy have produced conflicting results. Some studies<sup>124;125</sup> have shown evidence of reduced bladder tone. This has been disputed and in one study, bladder tone was demonstrated to increase.<sup>126</sup> Cutner has undertaken several studies to investigate urodynamic changes in women throughout pregnancy and the postpartum period.<sup>127-131</sup> There was evidence of increased detrusor over activity in pregnancy. Cutner also demonstrated the prevalence of urge incontinence in pregnancy to be 10%<sup>130</sup> although there was no correlation between symptoms and urodynamic diagnosis. There was a significant correlation between antenatal symptoms and the persistence of symptoms postnatally. During pregnancy, women who remained continent developed a gradual increase in the Functional Urethral Length (FUL) and Maximal Urethral Closure Pressure (MUCP). In contrast, women developing stress incontinence did not have an increase in these parameters.<sup>132</sup>

The pregnant uterus exerts pressure on the lower urinary system and pelvic floor structures. Changes known to be associated with SUI have been demonstrated during pregnancy,<sup>133;134</sup> in particular, a lower position of the bladder at rest and urethral hypermobility.<sup>135</sup> Episodes of urinary incontinence have been shown to peak in the third trimester when these anatomical changes are most apparent ( $p=.001$ ).<sup>136</sup>



This section will summarise the literature concerning risk factors for urinary and anal incontinence specific to pregnancy, labour and delivery. The first part of this section outlines the current evidence in relation to the contribution of parity to the development of incontinence. Following this, hormonal changes, connective tissue factors, denervation, mode of delivery, duration of labour, perineal trauma, fetal factors and epidural anaesthesia will be considered and evidence relating to the possible contribution of these factors to incontinence will be outlined.<sup>42;137</sup>

#### **2.4.3.1 Parity**

As with many of the risk factors for urinary and faecal incontinence, there is controversy in the literature concerning the contribution of parity. It would seem logical that the more pregnancies a woman has, the more chance there is of her experiencing the multiplicity of potential risk factors associated with incontinence, such as high birth weight, prolonged labour, anal sphincter damage, instrumental delivery and denervation. However, published studies are inconclusive and difficult to compare due to the numerous compounding variables.

When compared to nulliparous controls, ultrasound reveals morphological changes in the urinary tract after delivery demonstrating a significantly larger urethrovesical angle.<sup>138</sup> These findings are consistent with those observed in patients with SUI and strongly correlate with parity.

SUI at 8 weeks post partum has been found to be significantly related to parity ( $p=.009$ ),<sup>43</sup> with the higher the parity, the greater the risk of SUI ( $p=.01$ ).<sup>43</sup> In further studies at 3 months post partum,<sup>74</sup> similar results were found with higher parity having a significant effect on the prevalence of SUI ( $p=.0001$ ) and urge incontinence ( $p=.004$ ).<sup>100</sup> This observed rate of urinary incontinence occurs in parous rather than nulliparous women of all ages, being most common in women who have had four or more children.<sup>134</sup> It has been suggested that the relationship between increasing parity and urinary incontinence is linear.<sup>139</sup> Samuelsson<sup>85</sup> calculated the Odds Ratio (OR) for SUI in a study utilising self report questionnaire combined with physical examination. The OR for SUI increased from 1 to 2.7 with increasing parity. Further evidence is

provided by Snook<sup>140</sup> from a study involving serial urodynamic investigations of 71 postnatal women. Snook concluded that incontinence was related to denervation of the pelvic floor, which in multiparous women, was cumulative. In a similar but larger study involving 537 women, parity was found to be a key factor in the pathogenesis of obstetric perineal damage.<sup>101</sup> Studies looking at grand multiparae compared with nulliparae show a highly significant increase in the prevalence of SUI in the multiparous group, 21% vs. 5% respectively ( $p=.0008$ ).<sup>141</sup>

This correlation between incontinence and parity is disputed. In a study involving 322 incontinent women and 284 controls, no association was found between incontinence and parity.<sup>80</sup> Other large studies involving 523 women over a one year postnatal period<sup>89</sup> and 293 urogynaecology patients over a 4 year period,<sup>115</sup> have also failed to demonstrate any statistically significant association between urinary incontinence and parity. Delta PNTML has been shown to increase in all women after delivery and a study involving 146 women three months postnatally found that this was not associated with parity.<sup>105</sup> Buchsbaum<sup>142</sup> studied post menopausal nulliparous women and their parous sisters. The incidence of urinary incontinence was similar in both sister groups, and was not found to be associated with vaginal birth.

There are fewer studies exploring parity and faecal incontinence. In a study comparing 271 pairs of twin sisters, higher parity was found to be significant for the development of faecal incontinence (parity  $\geq 2$ ; OR 3.09, 95% CI 1.25-7.65). Chiarelli<sup>112</sup> followed up 568 women who had had "high risk" deliveries, defined as instrumental delivery or high birth weight. She found that compared with primiparous women, multiparous women had significantly greater odds of developing faecal symptoms such as soiling, urgency and incontinence (OR 2.18 95% CI 1.26-3.78,  $p=.005$ ). In a smaller, prospective observational study following 59 nulliparous women through two successive vaginal deliveries, questionnaire and anorectal physiological assessment was carried out antenatally and at 3 months postnatally. Five women developed faecal incontinence for the first time after their second vaginal delivery, of which three had occult primiparous sphincter injury. Pudendal nerve neuropathy was more common after the second delivery and pudendal nerve latency also significantly increased after the second delivery ( $p=.02$ ).<sup>5</sup> A large study involving

7557 antenatal patients found no association between faecal incontinence and parity during the antenatal period.<sup>113</sup>

This research has specifically chosen to recruit first time mothers only. As outlined above, data on parity is controversial and it was felt that a “pure” sample of first time mothers only, would provide a more accurate analysis of other risk factors.

#### **2.4.3.2 Hormonal changes**

The female genital and urinary tracts are particularly sensitive to the effects of female sex steroids. Several studies have identified the presence of oestrogen and progesterone receptors in the vagina, urethra, bladder and pelvic floor.<sup>143-146</sup> Oestrogens may play an important part in the continence mechanism. It is suggested that oestrogen may increase urethral resistance, raising the sensory threshold of the bladder. Oestrogen deficiency may reduce urine flow rate, increase residual urine and reduce bladder capacity.<sup>147</sup>

An increase in the incidence of DO during pregnancy has been attributed to the higher levels of progesterone<sup>129</sup> although this is contradictory to our understanding of the interacting physiology of progesterone and the characteristics of DO. Theoretically, high progesterone levels should be of benefit to women with detrusor over-activity, due to its muscle relaxant effect, and it may increase the severity of genuine stress incontinence, although neither effect has been conclusively proven. Similarly, detrusor over-activity increases in the luteal phase of the menstrual cycle and is believed to be associated with increased levels of progesterone following ovulation.<sup>147</sup>

Relaxin, produced primarily by the placenta, may have a role in connective tissue metabolism during pregnancy. It has been shown to induce collagen remodelling with consequential softening of the tissues of the vagina and perineum.<sup>148</sup>

#### **2.4.3.3 Muscular and connective tissue factors**

There are different types of collagen fibres, with differing compositions, structure and function. Research suggests that the collagen of women with stress incontinence may differ from that in women who do not have stress incontinence. For example, collagen

within the abdominal wall has been shown to be less elastic in women with GSI than in a control group.<sup>149</sup> Problematic stress incontinence prior to pregnancy has been associated with a decrease in mature collagen,<sup>150</sup> and the collagen of the pubocervical fascia of stress incontinent women has been shown to have structural abnormalities leading to weakness.<sup>151</sup> A reduction in total collagen and also a decrease in type I collagen has been found in the urethra of patients with urodynamically diagnosed GSI.<sup>150</sup> This abnormal composition of collagen fibres can reduce the tensile strength of connective tissue, leading to urethral sphincter incompetence and as such, may be a predisposing factor for stress incontinence.

Labour and delivery may impact upon the supports for the bladder neck, reducing stability, increasing mobility and leading to stress incontinence.<sup>123</sup> Morphological changes to the urinary tract are common after delivery. Sonographic appearance of these changes is almost identical to those observed in patients with stress incontinence.<sup>138</sup> Evidence from magnetic resonance imaging (MRI) and also from cadaver dissection has led to the formulation of the hammock hypothesis.<sup>152</sup> This hypothesis suggests that support for the bladder neck and urethra is derived via the endopelvic fascia, rich in collagen, and the levator ani muscles. With contraction of the levator muscles, force is transmitted through the anterior vaginal wall and endopelvic fascia. This in turn supports the bladder neck and urethral position. If the endopelvic fascia is disrupted, force from levator contraction is misdirected. A recent prospective study concluded that avulsion of the inferio-medial aspects of the levator ani from the pelvic sidewall occurred in one third of women delivered vaginally.<sup>153</sup> It is not clear if this soft tissue trauma is directly related to the development of incontinence.

During vaginal delivery, the endopelvic fascia and levator ani muscles may become traumatised. In addition, the nerve supply to the levator musculature, i.e. the pudendal nerve, may suffer stretch injury leading to denervation. The result may lead to stress incontinence.<sup>123</sup> MRI scanning<sup>154;155</sup> and Electromyography (EMG) studies<sup>156</sup> have both confirmed levator defects in primiparae following vaginal delivery. However, numbers are often small and comparison to antenatal MRI not usually performed.

There is also evidence that pregnancy itself, irrespective of mode of delivery, can lead to altered pelvic support<sup>157-159</sup> presenting a risk factor for pelvic floor dysfunction, even in primiparous women. There is evidence that the gravid uterus, by virtue of its weight and increased intra-abdominal pressure, might disturb levator ani function.<sup>160</sup>

#### **2.4.3.4 Denervation**

As the pudendal nerve runs along the pelvic floor, it is liable to stretch and traction injury during vaginal delivery. For some time it was believed that pudendal nerve damage was responsible for childbirth related faecal incontinence.<sup>161</sup> The injury is caused by descent of the perineal floor, which stretches the nerve as it emerges from its fixed site of exit from Alcock's canal. The result is muscle denervation and subsequent re-innervation by nerve sprouting.<sup>162</sup> An identical neuropathy causes incontinence in patients with rectal prolapse,<sup>163</sup> chronic straining at stool,<sup>164;165</sup> and pelvic-floor descent.<sup>164</sup> It has been suggested that vaginal delivery leads to partial denervation of the pelvic floor in most women having their first baby, possibly severe enough to lead to incontinence.<sup>166</sup> More recent studies suggest that this damage alone is poorly associated with bowel symptoms.<sup>167</sup> Traction injury to the pudendal nerve commonly accompanies obstetric sphincter lacerations which do contribute to faecal incontinence.<sup>140</sup>

Prolongation of PNTML may be an indication of neuromuscular damage. Evidence suggests that PNTML increases in up to 80% of women after vaginal delivery, although most primiparous women recover within 2 months.<sup>140</sup> There is some debate around the efficacy and accuracy of PNTML measurement and recent evidence suggests that EMG is probably more relevant to diagnosis of neuromuscular dysfunction.<sup>123</sup> Studies using EMG suggest partial denervation of the pelvic floor after vaginal delivery in 80% of primiparous women.<sup>166</sup> Using EMG, childbirth has been shown to induce both quantitative and qualitative changes to the pelvic floor, particularly levator activation patterns. These changes may jeopardize the continence mechanisms.<sup>168;169</sup>

Most published studies have evaluated anatomical and neurological aspects of pelvic floor function, assuming that labour and delivery lead to pudendal nerve neuropathy.

This has also led to the assertion, that a caesarean section will have a protective effect on the perineum. Data identifying obstetric risk factors and consequential perineal and nerve damage remain contradictory. The pathophysiology of urinary incontinence remains unclear. Pregnancy itself seems to be a considerable risk factor. The autonomic innervation of the bladder and urethra can degenerate during pregnancy and the regeneration after each delivery appears to be incomplete.<sup>170-172</sup> Traumatic stretching and compression of the peripheral nerve supply to the pelvic floor, associated with pregnancy, labour and delivery, may result in partial denervation of the striated muscle in and around the urethra<sup>173</sup> leading to urinary dysfunction and incontinence.

#### **2.4.3.5 Mode of delivery**

The stretching of the pelvic floor during vaginal delivery may damage the pudendal and pelvic nerves, in addition to the muscles and connective tissue of the pelvic floor. This may interfere with the ability of the urethral sphincter to contract. It has been suggested that vaginal delivery is the main contributing factor to the development of post natal urinary and faecal incontinence. Following vaginal delivery, Van Geelan<sup>174</sup> demonstrated urodynamic changes in the FUL and MUCP. These changes were not present in patients undergoing Caesarean section. However, like many other potential risk factors, the contribution of mode of delivery is disputed.

Some studies have found no association between the mode of delivery and the prevalence of postnatal incontinence. Clarkson received questionnaires back from 470 primips 9-14 months after delivery and found no significant difference in the rates of urinary or anal incontinence associated with mode of delivery.<sup>46</sup> Other studies have also failed to demonstrate any statistically significant difference between instrumental and spontaneous vaginal delivery and the rate of incontinence.<sup>43 71 175</sup>

Results of many epidemiologic<sup>47;49;78;139;176</sup> and pathophysiological<sup>177;178</sup> studies assessing the mode of delivery and incontinence have been largely inconclusive, often presenting contradictory conclusions. Part of the problem may be attributable to small sample size from specific populations.

One of the largest studies to date<sup>32</sup> included 15,307 women in total, 3068 of which identified themselves as incontinent. An additional 108 were classified as incontinent from their response to questionnaires. The study found that women who had a Caesarean section had a higher risk of incontinence than nulliparous women. Women who had had a vaginal delivery had the highest risk of all. Data for nulliparous women is included as Table 2.2. Tables 2.8 and 2.9 illustrate the effect of mode of delivery on incontinence. Compared to nulliparous women, Caesarean section had an age adjusted odds ratio for incontinence of 1.5, and those who had a vaginal delivery had an age adjusted odds ratio of 2.3. This large cross sectional study suggests that vaginal delivery significantly increases the risk of incontinence. However, this study did not investigate the specific mode of vaginal delivery or the length of labour. A similar large study by Glazener involving 3405 primiparous women did explore mode of vaginal delivery and found that vaginal birth increased the likelihood of postnatal urinary incontinence three-fold, compared to Caesarean section, irrespective of the mode of vaginal delivery.<sup>48</sup>

20-29yrs	No incontinence	Any incontinence	Severe incontinence	Stress incontinence	Urge incontinence	Mixed type incontinence
Caesarean Section (n=155)	86.50%	13.5% (n= 21)	5.2% (n= 59)	5.8% (n=9)	1.3% (n= 2)	4.5% (n= 7)
Vaginal delivery (n= 1548)	81.70%	18.3% (n= 283)	7.2% (n= 111)	10.5% (n= 163)	1.7% (n= 27)	5.3% (n= 82)

. Table 2.8 The prevalence of incontinence by mode of delivery 20-29yr olds

30-39yr	No incontinence	Any incontinence	Severe incontinence	Stress incontinence	Urge incontinence	Mixed type incontinence
Caesarean Section (n= 309)	87.10%	12.9% (n= 40)	3.9% (n= 12)	5.8% (n= 18)	2.3% (n= 7)	3.9% (n= 12)
Vaginal delivery (n= 3741)	78.80%	21.2% (n= 794)	8.4% (n= 316)	12.7% (n= 476)	1.6% (n= 60)	5.9% (n= 220)

Table 2.9 The prevalence of incontinence by mode of delivery 30-39yr olds

These large scale epidemiological findings are comparable to research by Farrell, who studied 690 primigravida. Vaginal delivery was associated with a higher incidence of UI (relative risk 2.8) compared with Caesarean section. When the mode of vaginal delivery was explored further, forceps delivery was associated with an increased risk (relative risk 1.5) compared to spontaneous vaginal delivery.<sup>47</sup> This increased level of

incontinence with instrumental delivery is widely supported,<sup>25;37;71;75;101;105;179-181</sup> with forceps leading to more incontinence than vacuum extraction.<sup>182</sup> Evidence from a small study examining 85 cases and 88 controls suggests an odds ratio for SUI after forceps delivery of 10.4<sup>183</sup>

The incidence of anal incontinence increases after instrumental delivery.<sup>67;69</sup> Abramowitz<sup>184</sup> used questionnaire and anal endosonography to study 233 women. In this study, the odds ratio for developing anal incontinence after forceps delivery was 4.5. This finding supports previous research identifying an increase in anal incontinence following operative vaginal delivery.<sup>57;66</sup> Disruption of the anal sphincter complex is associated with diminished sphincter pressures,<sup>185</sup> possibly leading to anal incontinence; and defects occur more frequently in women who have undergone forceps delivery.<sup>73;186;187</sup> Eason studied 949 pregnant women. Anal sphincter injury was strongly and independently associated with forceps delivery (relative risk 12.3) and vacuum delivery (relative risk 7.4).<sup>65</sup> Similarly, in a 6 year follow up study by MacArthur involving 4,214 women, of which 1,807 had had no further children, forceps delivery was independently predictive of persistent faecal incontinence.<sup>70</sup>

Elective Caesarean section has been shown to be partially protective against the development of postnatal urinary and faecal incontinence.<sup>44;49;68;108;156;179</sup> This protection against urinary incontinence seems to remain regardless of what stage of labour the Caesarean is performed.<sup>47</sup> However, when performed late in the first stage or second stage of labour, the protection against anal incontinence may be reduced.<sup>188</sup> Recent research by van Brummen illustrates the importance of considering the timing of investigation. In a longitudinal cohort study, similar in design to this research, primiparous women completed questionnaires at three month and one year postnatal. Although initially, the Caesarean delivery group had lower rates of urinary incontinence, the reported prevalence increased over the postnatal year, and by one year after birth, the Caesarean group had higher rates of urge urinary incontinence than the vaginal delivery group.<sup>49;108</sup>

This finding is disputed by McKinnie<sup>189</sup> who found that whilst pregnancy increased the risk of both urinary and faecal incontinence, Caesarean delivery did not offer any



decreased risk. However, the method and classification of comparison groups used by McKinnie may have influenced the results; the comparison groups being differentiated by pregnancy proceeding to full term in addition to the mode of delivery. Odds ratios are presented and compared to “no *term* pregnancy.” However, a recent well constructed study with long term follow up (18 years) also found that Caesarean delivery offered no statistically significant reduction in risk of postnatal severe faecal incontinence.<sup>190</sup>

#### **2.4.3.6 Duration of labour**

When considering the impact of labour on urinary and faecal incontinence, it is important to differentiate between the total duration of labour and the duration of the second stage of labour when comparing results. Many studies fail to differentiate between the stages of labour making it difficult to compare results. During the second stage of labour, the structures of the pelvic cavity are exposed to considerable forces as a result of uterine activity, maternal pushing and the passage of the fetus from the uterus, via the vagina during the process of birth. These forces have not, to date, been systematically quantified and measured. However, it can be anticipated that there will be considerable variation in the characteristics and consequences of these forces which may well affect outcomes. This may be one possible explanation for the conflicting findings discussed below. A further possible explanation is that the concept of labour duration is relatively subjective. Defined as the onset of regular painful contractions, exactly what constitutes “regular” will vary between practitioners and is often based on the perception of the woman rather than a tangible, quantifiable event.

A correlation has been demonstrated between the total duration of labour and the degree of postnatal SUI.<sup>130;181</sup> A correlation has also been demonstrated between the length of the second stage of labour and the development of postnatal urinary symptoms.<sup>191</sup> Prolonged active pushing during the second stage of labour has been shown to be associated with neuromuscular injury.<sup>173</sup>

However, these findings are disputed by others who found no such correlation with urodynamic parameters.<sup>105;174</sup> A study by Van Kessel took the form of a case control

study of first time mothers, with a follow up period in excess of 7 years. The length of the second stage of labour for the first delivery was not associated with SUI symptoms (OR 1.07;  $p=.42$ ; 95% CI).<sup>183</sup>

When considering faecal incontinence, there is also disagreement in the literature. Prolonged labour has been identified as an independent risk factor for faecal incontinence.<sup>66;67;184</sup> This may be due to damage to the external anal sphincter as a result of a prolonged second stage of labour.<sup>140</sup> The largest of these studies included 300 women. The association between length of second stage and anal incontinence is disputed by larger studies involving 949 women,<sup>65</sup> and 9,879 women<sup>69</sup> where no correlation was found.

#### **2.4.3.7 Perineum**

Following delivery of the baby, the perineum is assessed for damage. Perineal damage can occur as a result of tears or episiotomy. The result can be impaired support to pelvic organs and an alteration to their natural position. There may be no damage at all and the perineum is said to be “intact”. The Royal College of Obstetricians and Gynaecologists (green top guidelines 23 and 29) classify perineal trauma as follows:

- First degree tear: laceration of the vaginal epithelium or perineal skin only.
- Second degree: Involvement of the perineal muscle but not the anal sphincter.
- Third degree: disruption of the anal sphincter muscles subdivided as follows:
  - 3a: <50% thickness of external sphincter torn
  - 3b: >50% thickness of external sphincter torn
  - 3c: Internal sphincter also torn
- Fourth degree: a third degree tear with disruption of the anal epithelium

Most studies focus on severe perineal trauma and the association with potential anal incontinence. In particular, recent research has focused on the identification and consequence of anal sphincter trauma as a risk factor for anal incontinence.

Third and fourth degree tears are believed to be a risk factor for faecal incontinence with many women having faecal urgency or incontinence after third-degree obstetric lacerations (Table 2.10). In most cases, patients identified as having a third or fourth

degree tear will be specifically asked about incontinence symptoms in the postnatal period and may be followed up at specialised clinics, possibly involving a colorectal surgeon. This specific postnatal care is reliant on accurate assessment and diagnosis of the perineum at the time of delivery.<sup>192</sup>

Author	Year	Sample size	Follow up	Anal incontinence (%)
Beck <sup>193</sup>	1992	121	-	50
Borello-France <sup>194</sup>	2006	407 with anal sphincter tears 390 controls having vaginal delivery 124 pre-labour CS	6 weeks postpartum  6 months postpartum	26.6 (11.2 for controls)  17 (8.2 for controls)
Faltin <sup>190</sup>	2006	259 plus 281 controls	18 years	13.1 severe AI (7.8 for controls)
Fitzpatrick <sup>195</sup>	2000	154	3 months	53
Fornell <sup>196</sup>	1996	51 plus 31 controls	6 months	40
Fornell <sup>197</sup>	2005	51 plus 31 controls	10 years	30
Gjessing <sup>198</sup>	1998	38	12-60 months	57
Goffeng <sup>199</sup>	1998	27	12 months	59
Haadem <sup>200</sup>	1988	62	3 months	44
Kammerer-Doak <sup>201</sup>	1999	15	4 months	43
Nielsen <sup>202</sup>	1992	24	12 months	29
Poen <sup>203</sup>	1998	117	56 months	40
Sander <sup>204</sup>	1999	48	1 month	21
Sangalli <sup>205</sup>	2000	177	13 years	15
Sorensen <sup>206</sup>	1993	38	3 months	24
Sorensen <sup>207</sup>	1988	25	78 months	42
Sultan <sup>192</sup>	1994	34	2 months	41
Tetzschner <sup>208</sup>	1996	72	24-48 months	42
Walsh <sup>209</sup>	1996	81	3 months	20
Wood <sup>210</sup>	1998	84	31 months	17
Zetterstrom <sup>75</sup>	1999	46	9 months	41

Table 2.10 Anal incontinence after anal sphincter rupture (excludes those resulting from midline episiotomy)

Recent studies have found evidence of postnatal occult anal sphincter damage in 7-28% of primiparous women<sup>184,102;211;212</sup> with one study demonstrating 19% of primiparous women who were classed as having a first or second degree tear having an anal sphincter defect on endo-anal scan.<sup>102</sup> Whilst some earlier studies found higher prevalence rates, it is thought that some misdiagnosis may have occurred when anal ultrasound was being developed as a diagnostic tool.<sup>213</sup> Additionally, some disparity may be attributable to differing definitions of “defect”, different ultrasound equipment and resolutions, or sample selection. A recent study by Andrews<sup>211</sup>

suggests that appropriate training in perineal anatomy and recognition of anal sphincter disruption, may increase detection rates of third degree perineal trauma.

A meta-analysis of 717 vaginal deliveries found a frequency of sphincter defects of 26.9% in primiparous women.<sup>214</sup> Although only 29.7% of women with sphincter defects were symptomatic in the postpartum period, the probability of faecal incontinence resulting from these defects was calculated to be 76.8–82.8%. The fact that many women with sphincter injuries do not develop incontinence until later in life suggests a cumulative, multi-factorial process.<sup>215</sup>

Women with midline episiotomies are five times more likely to develop faecal incontinence at 3 months post delivery, than those with an intact perineum.<sup>216</sup> Whilst medio-lateral episiotomy has not been shown to have such detrimental impact,<sup>3;69;174;217</sup> neither has it been shown to offer any protection. It may even weaken the pelvic floor.<sup>218</sup>

Urinary incontinence has not been shown to be associated with sphincter trauma.<sup>194</sup> However, research focusing on the urinary impact of anal sphincter trauma is sparse and further investigation is needed before conclusions can be drawn.

#### **2.4.3.8 Fetal factors**

Controversy remains concerning the contribution of fetal weight or head circumference to the development of post-natal urinary or anal incontinence. Whilst some studies suggest increase in fetal size increases the risk of incontinence,<sup>41;113;166;181;219</sup> possibly due to partial denervation of the pelvic floor, other studies found no such association.<sup>68-70;99</sup> Both positions contain large scale studies involving over 7,500 women. Compounding variables including the demographic and physical factors referred to above and which include previous pregnancy events, may well have contributed to the lack of conclusive evidence. As is so often the case in studies which concentrate on a particular independent variable and dependent variable, results may be influenced by a range of other variables not directly covered in the design. In addition, whilst some studies have focused on birth weight, others have used head circumference as a measure. In reality, a combination

of fetal BMI and head circumference may yield greater accuracy in assessing the contribution of fetal size. No studies to date have used this data. Two studies looking specifically at first time mothers do support a link between increased fetal size and incontinence.<sup>166;180</sup>

#### **2.4.3.9 Epidural anaesthesia**

Epidural anaesthesia has been shown to lead to a higher incidence of postnatal stress incontinence.<sup>191</sup> However, this may have been secondary to a longer labour, as those patients in this study who had an epidural also had significantly longer labour duration. Although epidural anaesthesia has been linked to postnatal urinary retention and voiding difficulty,<sup>220</sup> no association has been found with delta PNTML,<sup>105</sup> urinary incontinence or anal incontinence.<sup>71</sup>

#### **2.4.4 SUMMARY OF RISK FACTORS**

From the evidence available, some risk factors for the development of urinary incontinence in an obstetric population can be identified, for example raised BMI, vaginal delivery, and instrumental delivery. Other risk factors remain controversial. These include smoking, age, diet, increased parity, total labour duration, length of second stage of labour, fetal size, and genital tract trauma.

Established risk factors for the development of anal incontinence in an obstetric population include advancing age, anal sphincter trauma and possibly diet. However, smoking, raised BMI, increased parity, vaginal delivery, instrumental delivery, fetal size and labour duration require further investigation.

This research will not only collect data on many of these variables from a sample controlled for parity, but will also collect data on numerous other factors, which to date have not been explored in previous studies.

### **2.5 INCONTINENCE AND QUALITY OF LIFE**

The sections above are concerned with the identification of risk factors, or causes of urinary and anal incontinence. Together with causes, this research will also address

consequences of incontinence on quality of life, in particular, sexuality. Firstly, this section will consider the concept of "quality of life." Following this there will be a brief overview of the function of quality of life instruments. Finally, a brief summary of current literature in relation to incontinence and quality of life will be presented.

Quality of life (QoL) is a multidimensional concept which is linked to the World Health Organisation (WHO) definition of health being "not merely the absence of disease, but complete physical, mental and social well-being."<sup>221</sup> This definition emphasises the importance of including functional, social, cultural, subjective and socio-psychological variables that impact on role performance, independent living and perceived well-being in any elaborated concept of health.<sup>24</sup> Later, the WHO added autonomy as a key determinant of quality of life. This broad and inclusive definition transcends the medical model of health.

Health related quality of life (HRQoL) is more specific. It refers to the individuals' appraisal of their current level of functioning and satisfaction with it compared to what they perceive to be ideal.<sup>222</sup> The purpose of a HRQoL instrument is to not merely to measure the presence and severity of disease symptoms, but also to show how the manifestations of a treatment or illness is experienced by an individual.<sup>223</sup> Although there is no agreed single definition of health-related quality of life, there is consensus that components such as general health, cognitive functioning, mental health, emotional state, subjective well-being, life satisfaction and social support should be included.<sup>24</sup>

Health Related Quality of Life is usually measured using a self-completed questionnaire, specifically designed to gather information about various aspects of health. Questionnaires may be generic or disease specific. Due to the broad nature of the questions, generic questionnaires may lack sensitivity when applied to women with conditions such as urinary incontinence.<sup>23</sup> Consequentially, a number of disease specific HRQoL instruments have been designed.

Urinary incontinence is a complex condition that may, with varying severity, significantly impair the life style of those women affected.<sup>23</sup> Urinary symptoms

impact upon different women in different ways. Physical, psychological, social, domestic and interpersonal lifestyles may be affected. Individual circumstances, age, culture, relationships, ambition, experience, physical health and self-esteem may influence the extent to which symptoms are perceived and the impact they have upon the quality of life of the individual concerned.

Measurement of HRQoL is an essential component of assessment of, and treatment for, urinary incontinence. Whilst it may be expected that severity and frequency of symptoms would be major predictors of quality of life impairment, they do not *per se* correlate with QoL measurements. Consequentially, in some studies HRQoL instruments have replaced traditional urodynamic measurement.<sup>23</sup>

### 2.5.1 QUALITY OF LIFE MEASUREMENTS AND CORRELATION WITH CLINICAL MEASURES

Instruments used to assess HRQoL are designed to assess the impact of symptoms, not provide an accurate urodynamic diagnosis. Whilst it has been shown that women with a poorer HRQoL who have detrusor over-activity, are less likely to respond to conventional treatments,<sup>224</sup> HRQoL measurements alone are insufficient to provide accurate diagnosis and planning of treatment.<sup>225</sup> Assessing the impact of symptoms on various aspects of lifestyle does however allow a more meaningful and stable comparison both between patients, and for the same patient before and after treatment.<sup>23</sup>

Agreement between clinical measures, patient experience and urodynamic findings is often poor. This phenomenon may be due to the non-specific, unreliable nature of the symptoms. Poor sensitivity of cystometry has been cited as a potentially contributing factor to this disparity.<sup>226</sup> It is now accepted that the most accurate measure of health related quality of life is obtained via the use of a self completed questionnaire.<sup>226</sup>

### 2.5.2 IMPACT OF URINARY INCONTINENCE ON QUALITY OF LIFE

As in prevalence studies, QoL studies vary in design, definitions, criteria and methodology. Given these variances, several studies report similar findings. In

particular, incontinence symptoms were associated with avoidance behaviour,<sup>7;11;227;228</sup> a reduction in social activity or mobility,<sup>7;12;33;227-231</sup> depression,<sup>11;12;49;228;232;233</sup> and a negative effect on sexual relationships. Sexual aspects will be discussed more fully in Section 2.7-2.9. Whilst several researchers have suggested a link between incontinence and depression,<sup>234-237</sup> these studies are usually conducted in a clinical setting, employing depression symptom screens rather than psychiatric assessment. It is suggested that incontinence and depression may share common neurochemical pathogenesis. Animal models have shown that a decrease in monoamines such as serotonin and noradrenalin leads to depression and urinary symptoms such as frequency and urge incontinence.<sup>235</sup> The relationship between depression and incontinence is likely to be bidirectional. The functional impairment associated with incontinence may lead to depression<sup>238</sup> whilst conversely, depression and altered neurotransmitter function may lead to uninhibited detrusor contractions and urge incontinence.<sup>239</sup> People with depression are likely to exaggerate their physical symptoms of a disease, such as incontinence, reporting higher severity rates.<sup>238</sup> One study, which used a similar research method to this research, concluded that urinary incontinence had minimal impact on quality of life.<sup>37</sup>

Urodynamic diagnosis appears to be a major factor in predicting QoL impairment.<sup>23</sup> The greatest detrimental impact on health related quality of life has been identified in women with detrusor over-activity,<sup>19;240;241</sup> possibly due to the unpredictability and diminished sense of control associated with the condition.<sup>242</sup> In some cases, this may lead to altered social activity and employment choices.<sup>243</sup>

### 2.5.3 IMPACT OF FAECAL INCONTINENCE ON QUALITY OF LIFE

Faecal incontinence is a common complaint that receives little attention in medical publications. It can contribute to medical morbidity and also can incur substantial, continuous financial expenses,<sup>244</sup> but its main effect is on quality of life.<sup>215</sup> Faecal incontinence often results in embarrassment, shame, and depression.<sup>57</sup> Sufferers may plan their life to maintain rapid access to a toilet. Social activities such as shopping and dining out are often avoided. In some cases, total abstinence from intimacy and sexual activity will result.<sup>215</sup> Women who are incontinent of liquid material report the greatest impact upon quality of life<sup>53;245</sup> as this is more difficult to control or conceal.



Six years after the birth of their baby, women with persistent faecal incontinence showed significantly increased anxiety and depression scores.<sup>70</sup>

## 2.6 THE SELF

Whilst the main focus of this research is on factors associated with childbirth, subsequent incontinence and the influence of that incontinence on quality of life and sexuality, the important role of self report in contributing data does require some consideration of the nature, operationalisation, and measurement of “self.” Furthermore, one particularly important aspect of self considered in this study is the notion of sexuality. For the purposes of this research, sexuality is defined and operationalised through an established scale.

In focusing on sexuality as an important aspect of quality of life, this research will employ the Sexuality Scale. The nature of the Sexuality Scale implies the existence of a Self who is able to reflect on her experience. This assumption is a complex one. The idea of a conscious reflective self is both compelling and intangible. On the one hand the self might seem an obvious corollary of consciousness, on the other hand precise definition and scientific investigation proves complex and illusive. Some ideas of Self and Self development are reviewed below.

Psychology, the scientific study of behaviour and mental processes,<sup>246</sup> aims to observe, describe, measure, explain and possibly predict behaviour and mental processes. Problems arise as the self as a concept is difficult to quantify, measure, observe and evaluate.

The concept of Self has evolved into two distinct meanings; the Self as an object referring to our capacity to see ourselves as others do and evaluate our attitudes and beliefs; and the Self as a process able to think, perceive, remember and perform. As such, Self is not just what we have and what we are, but also what we do. Broadly, the Self is a component of our consciousness that gives us a sense of personal existence, incorporating our total subjective and intrapersonal world.<sup>247</sup> Much of human behaviour is complicated and often requires an element of self-reflection. Emotions and the way we related to others can be drastically altered by individual thought,

perception and reflection. So much so, that it has been suggested that the capacity for self-reflection lies at the very centre of “the Self,” it being impossible to fully understand human behaviour without taking account of this capacity to think about oneself.<sup>248</sup>

The Sexuality Scale employs cognitive, affective and behavioural measures of sexuality and as such, an understanding of the theoretical context behind these measures is vital to this research. This part of the literature review will explore the meaning of self, the development of self, self-concept, self-esteem, behaviour, self-consistency, development and social interaction and finally self-protection.

### 2.6.1 THE MEANING OF “SELF”

When terms including “self” are examined, for example, self-esteem, self-actualization, self-awareness and self-talk, it is clear that the word “Self” has varying meanings in each of these constructs. This is particularly relevant to this research as the Sexuality Scale measures three specific aspects of the sexual self, namely esteem, depression and preoccupation. There is even disagreement amongst academics on how many different ways “Self” and its compounds are categorised.<sup>248</sup> There is general consensus that we have an internal and an external self.<sup>249</sup>

#### **2.6.1.1 The Self as a total person**

The terms “Self” and “Person” have sometimes been used interchangeably. Essentially, this is a biological definition. Compounds utilising this definition include self-harm, harming the biological body; self-monitoring, a person monitoring themselves as a person, or self-defeating behaviour, the undermining of individual well-being. This biological definition, using self as a synonym for person, is quite distinct from the psychological or sociological definitions of self.

#### **2.6.1.2 The Self and personality**

Tesser<sup>250</sup> described the Self as “a collection of abilities, temperament, goals, values and preferences that distinguish one individual from another.” Here, it appears that “Self” has been used as a synonym for personality. As the sections below illustrate,

personality and Self are inextricably linked in their development, however, they are not inter-changeable terms and are two quite distinct concepts.

2.6.1.3 The experiencing Self; the Self as knower

It was James<sup>251</sup> who first made the distinction between Self as subject, or I, and Self as object, or Me. The “I” is self-aware and self-knowledgeable, and has been described as the subject of a person’s experience, thoughts and feelings.<sup>248</sup> The “I” is the agent of experience, encompassing thought, perception and memory. Hamachek<sup>247</sup> offers a schematic overview, illustrating how the components of Self link together. (Figure 2.1)

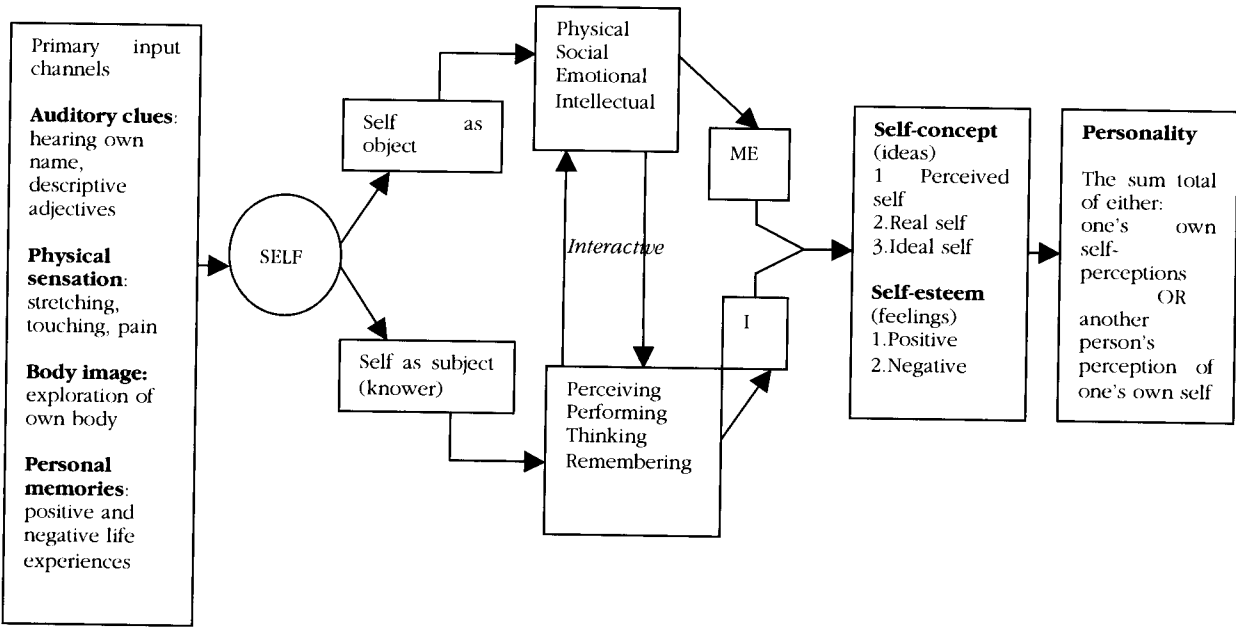


Figure 2.1: Schematic overview of the self’s development

2.6.1.4 Self beliefs; the Self as known

In contrast to the Self as knower, the Self as known, or Me refers to people’s beliefs about themselves. An example of this is self-disclosure, when information about one-self is shared with another person. “Me” also incorporates physical attributes, such as how one looks; social aspects and how one relates to others; emotional aspects

involving how one feels and intellectual aspects – how one thinks.<sup>247</sup> The “Me” is the content of experience.

#### **2.6.1.5 The Self as decision maker; the ghost in the machine**

Most behaviour is consciously regulated. This executive feature of the Self is responsible for self-control and self-regulation.

There are numerous definitions of Self, and as stated above, many academics do not agree. What is clear is that the word “Self” is involved in a persons’ experience, their thoughts and feelings and also their behaviour. Central to this ability is the capacity of personal reflection. From this, the Self could be defined as “the mental capacity that allows an animal to take itself as an object of its own attention and to think consciously about itself.”<sup>248</sup>

#### **2.6.2 THE DEVELOPMENT OF SELF**

Whilst some of the various components of Self have been identified above, it is important to understand how these concepts fit together and arise during human development if an understanding of behaviour and cognitions is to be pursued. The evolution of the Self, from infancy through life, is a complex process involving ongoing interaction between our genetic potential and our environmental experiences.

According to James,<sup>252</sup> as the child matures, they begin to understand the world more fully. The self-concept becomes differentiated into four parts. The bodily self, relating to body image; the social self, concerning our relationships and feedback from others; the material self, relating to possessions we see as part of us and the spiritual self, concerning how one feels. These aspects interact with perceiving, thinking, performing and remembering functions to form the knower or “I” and the known or “Me.” First described by William James in 1890,<sup>252</sup> the “Me” is simply an object, like any other; whereas the “I” is the active sense of personal identity.<sup>253</sup> However, this concept presents difficulties at a psychological level. The self-reflexive act involved in identifying the Me, at the same time links and integrates the knower and the known. Each can not exist without the other. The Self is simultaneously Me and I. It is impossible to imagine consciousness in an abstract form, lacking content. Likewise,

we can't imagine content existing separate from the consciousness that permits awareness of it. How well can I know Me, when I am doing the knowing and I am Me?

The result of the combining of these attributes and functions is the development of two vital components of Self. **Self-concept** encompasses ideas about oneself and **self-esteem** concerns evaluations and feelings about oneself. The result is the beginnings of personality development.<sup>254</sup> Most of the psychological phenomena studied in relation to the Self, involve one or more of three inextricably linked processes – attention, cognition and regulation.<sup>248</sup>

#### **2.6.2.1 Attentional processes**

Given the definition above, that the Self is the mental process underlying self-reflection, at some point, conscious attention must be directed inwardly, at oneself. Evidence suggests that this attention towards oneself will have an impact upon thoughts, emotions and ultimately, behaviour.<sup>255;256</sup>

#### **2.6.2.2 Cognitive processes**

Thinking about oneself will inevitably generate thoughts relating to the current situation, attributes, roles, memories, the past and the future.<sup>248</sup> This underlies the construction of self-concept, identity, moral codes, standards and emotions.<sup>257</sup> These self-applicable cognitions link the social world to the individual.

#### **2.6.2.3 Executive and regulatory processes**

The attentive and cognitive processes outlined above, provide the individual with an ability to think about themselves, their behaviour and also to regulate that behaviour in the future, thus offering a degree of self-control.

### **2.6.3 SELF-CONCEPT**

Self-concept refers to a particular cluster of ideas we have about ourselves. It is our cognitive view of our self as an individual, derived from the sum of our experiences. It is from these experiences we develop the thoughts and ideas about the kind of person we think we are; that is our private and personal mental image of the person

we are. This personal cognitive view is a key component when exploring the impact of incontinence on quality of life and particularly, aspects of sexuality.

Perhaps the most important distinction that differentiates various conceptualizations is whether self-concept is viewed as a relatively stable, global characteristic of the person, or as a set of self-evaluations specific to different domains of behaviour. Multifaceted models stress self-evaluations of specific competencies or attributes, for example, academic self-concept, physical self-concept, and so on.

Self-concept is a multi-faceted concept encompassing appearance, relationships, thoughts and feelings to provide us with a framework of ideas, or schema, about who we are. However, the Self we really want to be may not resemble the Self we perceive ourselves to be or how others see us. Self-concept is the cognitive or thinking part of self-perception. These cognitive processes combine to influence behaviour.

#### **2.6.3.1 Sources and content of self-concept**

The development of self-concept continually evolves through-out life. Numerous inter-related factors influence and shape this concept. Body awareness and body image, furnished initially through sense perception, is the basic core round which self-reference and identity is moulded.<sup>258</sup> The study of physical characteristics and psychological factors and their relationship to personality variables remains tenuous. Social learning, stereotypes and expectations will undoubtedly influence behaviour, self-concept and personality.<sup>259 260</sup>

Whilst a child's self-concept is not *caused* by body image, physical appearance will play an important role. Feedback and expectations are often based on physical appearance, at all age levels. This can have a particularly potent effect on the development of self-concept. In a series of studies,<sup>261-264</sup> high self-esteem has been shown to correlate strongly with one's physical body and social acceptance.

Most personality theorists agree on the role of significant others, particularly parents, peers and siblings, being an influential source of information about oneself. Parents have the greatest impact in developing conceptions of Self. The self-portrait is

gradually rebuilt and modified according to the experiences the child has and the adjectives they hear used to describe them.<sup>258</sup> External standards and societal norms do not exert the same degree of influence as interpersonal relationships with relatives and friends.<sup>265 266</sup> As a child develops and experiences new things, the concept of their self-concept will also change and expand, coming to include possessions, friends, values and loved people.<sup>258</sup>

#### 2.6.4 SELF-ESTEEM

Not only do we have *ideas* about who we are, but we also have *feelings* about who we are. Whereas self-concept is primarily descriptive, self-esteem is more evaluative. It is the construct of our evaluation of the things we do, our achievements and our sense of worth. Self-esteem involves affective or attentional processes. It is a function of the distance between our ideal Self and our perceived Self. When the perceived Self matches the ideal Self, self-esteem is high. When the perceived Self is lower than the ideal Self, self-esteem is lower. The distance between the ideal Self and the perceived Self will fluctuate depending on the task and social feedback. Consequently, self-esteem is a dynamic component of self-concept and will change and develop with each new situation.<sup>247</sup>

Social comparison and the groups we compare ourselves with play an important role in determining how we feel about ourselves. High self-esteem usually comes from being able to do things as well, or better than the people we choose to compare ourselves with. The goals and personal aspirations we set ourselves also play an important role in self-esteem, as they determine what we may view as a success or failure and as such, may add to or subtract from our self-esteem.

Self-esteem is the affective or feeling aspect of self-perception. It is the evaluative component of our self-perceptions and influences our description of ourselves and our behaviour. We can each set our own goals, and evaluate our success against them. James' Law<sup>252</sup> asserts that a position a person holds in the world is conditional on success or failure and determines self-esteem. For James, how we feel about our Self is determined by how we see ourselves in relation to others. Feelings of self-worth and self-esteem derive partially from our perceptions of where we see ourselves in

relation to others whose skill and abilities are similar to our own. Expectations are self-imposed and refer to our personal level of aspirations.

<sup>267</sup> In Brockner's review of self-esteem literature<sup>268</sup> he noted that people with low self-esteem are also more susceptible to influence attempts, anxiety-provoking stimuli, suggestibility and self-focus manipulations. Essentially, people with low levels of self-esteem are very susceptible to negative social feedback and social comparisons. This is further supported by conformity literature, which shows that people conform more readily to the judgements of others when they lack confidence in their own judgements.<sup>269</sup> Similarly, when people lack clear and confidently held internal beliefs about themselves, they are more dependent on external cues that convey that information.<sup>270</sup> It appears that both the evaluative and knowledge components of the Self influence self-esteem

#### 2.6.5 BEHAVIOUR

James<sup>251</sup> described how we behave differently in different situations. This phenomenon was developed further by Goffman<sup>271</sup> who suggests that we put up a staged "front" which we alter in each circumstance in the hope that it will satisfy the expectations we feel others have of us. When this is done and we behave in a way we feel others expect us to, this is termed *impression management*. In doing so, we use regulatory, executive processes to modify our behaviour. Goffman believed that societal norms influence and drive our behaviour. We have learned what is expected of us and we have also learned that it is necessary to employ these tactics in order to get what we want, for example people to love us, like us, hire us and respect us.

Normally people will behave in a style consistent with their concept of Self.<sup>272</sup> Markus<sup>273</sup> illustrates how our self-schemas influence our behaviour. We behave in ways consistent to how we see ourselves. We act like the person we perceive ourselves to be. If we see our self as shy, we will behave in a quiet, reserved manner. Our self-perceptions are a form of self-labelling, which we turn into self-fulfilling prophecies by behaving in a way that confirms both their existence and validity.<sup>274</sup>



Self-concept theory provides a conceptual framework for understanding and predicting behaviour, by taking into account their perception of themselves. Self-schema are cognitive generalisations about aspects of one-self which are derived from past experiences, manifest in current experience, influential in the processing of relevant social information and guide our behaviour. In summary, the way we think, affects the way we feel, which in turn influences the way we behave.

2.6.6 PROTECTING THE SELF

The use of defence mechanisms is a normal human reaction, the objective of which is to protect the integrity of the Self. Understanding these mechanisms can provide insight into the behaviour, motives and feelings of our self and others. During these processes, facts may become distorted or denied in order to fulfil our psychological needs and maintain consistency of our perceived self. It is anticipated that some defence mechanisms may be evident in the replies obtained from subjects enrolled in this research. They may be used to distort the severity of a condition, influence help-seeking behaviour, influence sexual self-perception and behaviour and also provide insight into motives and feelings towards the individual affected and others. Various methods may be employed and include:

Compensation	Here the “weakness” is disguised by emphasizing strength in another area. For example, a person who feels unloved may become sexually promiscuous. <sup>247</sup>
Denial	Sometimes we avoid the unpleasant by refusing to acknowledge it. We may refuse to discuss unpleasant topics, ignore criticism or ignore feedback.
Displacement	Emotions are moved from one person, object or topic to another. This allows us to vent emotions without damaging certain relationships. For example, a woman who is having difficulty with her relationship with her husband may take her frustration out by shouting at the children.

Emotional Isolation	In this case, a metaphorical wall is placed between the person and the unpleasant aspect they are trying to avoid. This can lead to complete isolation from society in general or one aspect of it.
Fantasy	The capacity to remove ourselves temporarily from unpleasant reality into a more acceptable world of fantasy can have therapeutic value. <sup>247</sup> It may provide motivation or inspiration. When we use fantasy as a permanent escape psychological problems can occur.
Humour	In a longitudinal study following the lives of 268 men over a 35 year period, Vaillant <sup>275</sup> noted that those with a well developed sense of humour coped better with the every day trials of life and were psychologically healthier.
Projection	Using projection, a person can transfer blame for their own short comings, feelings, desires or impulses onto another. An example would be telling ourselves that the reason we feel depressed, unloved etc is because of another person's behaviour towards us. The process involves both denial and displacement of feelings. Often the characteristics we attribute to someone else are a reflection of our own personality, which we are trying to deny.
Rationalization	In rationalizing, we firstly invent excuses for our actions or omissions. Secondly, we serve to reduce the disappointment we will feel when we fail to reach the goal we had set ourselves. For example, "I didn't have

time to ....” “I was probably asking too much of myself...” “They wouldn’t understand anyway...”

#### Reaction Formation

This self-deceptive mechanism involves a reversal of feelings. “I detest you” becomes “I love you.” “I am depressed” becomes “I am really happy about this.”

#### Regression

Regression involves the retreat to behaviour patterns associated with earlier stages of development. A child may resort to bed wetting. An adult may become submissive and child-like in their behaviour.

#### Repression

Painful thoughts are excluded from consciousness to protect oneself from painful experiences. Repression has also been termed “selective memory loss.”

#### Sublimation

When our drive for a particular goal becomes blocked, we may accept a socially approved substitute. For example, a childless woman may redirect her desire and work with children in a career which provides an opportunity for close relationship, affection and bonding.

#### Suppression

A conscious process of excluding painful thoughts. For example, by not making an appointment at the doctors today and putting it off until next week we allow ourselves a temporary respite. Unlike repression, when next week comes, the issue is addressed.

#### Undoing

Behaviour to atone for a disapproved act. A sincere apology is a form of undoing. This is a healthy normal response when we realise that we have hurt someone. It

is unhealthy when it becomes a substitute for a lack of forethought.

Whilst each of these processes can play a part in protecting the integrity of the Self, and to some extent are healthy responses to certain situations, continual over compensation for a weakness can lead to a failure to address the underlying problem. Furthermore, psychological problems can deepen and intensify. "I have failed because of these circumstances, but I don't like it" is a normal response. "I have failed because the world is against me. I don't like myself" is an unhealthy response.

## **2.7 THE SEXUAL SELF**

The term sexuality is ambiguous and difficult to define. Whilst it certainly incorporates gender and sexual activity, self-perception and social interaction are also essential components and these are often overlooked. This ambiguity and confusion is compounded by the inappropriate use of the term sex, defining gender; sexual activity and sexual preferences; and the term sexuality, a more encompassing concept incorporating sociology, psychology and social interaction. The two quite different terms are frequently used erroneously and interchangeably.

Human sexuality is a multidimensional phenomenon combining biological, psychosocial, behavioural, clinical, moral and cultural aspects.<sup>276</sup> Sexual attitudes and practices may vary considerably over time, place, culture, religion, age and experience. As such, no established single set of norms exist. Many individual, social and personal variables have been found to relate to one's view of his or her sexuality and also to influence behaviour.

Research into sexuality has been criticised from two perspectives. Methodological problems of measurement include bias, under reporting, sexual bragging and influence from social desirability.<sup>277</sup> These problems have often combined with participation bias to weaken many sexuality studies. Andersen<sup>278</sup> suggests that using explicit terminology and items to explore sexuality has exacerbated this problem further and a discrete measure of sexuality domains would have powerful methodological advantages. Furthermore, if elements of the cognitive Self were

tapped, this would add a further dimension to understanding aspects of sexuality such as behaviour, attitude and response. The second fundamental criticism of sexuality research concerns the lack of concepts and theories to explain sexual phenomena, adopting instead empirically-driven documentation and observation. Three major contributors to empirical research include Kinsey,<sup>279</sup> Masters and Johnson.<sup>276;280;281</sup> Whilst offering a considerable contribution to the understanding of sexual physiology, their work lacks a comprehensive evidenced theory.

The following sections will focus on sexual behaviour; sexual response – particularly desire, excitement, orgasm and evaluation; individual differences; sexual self-concept and sexual dysfunction. These factors will combine to explain cognitive, affective and behavioural aspects of the sexual Self. Following this foundation, the theoretical background for the Sexuality Scale will be addressed in greater detail.

### 2.7.1 SEXUAL BEHAVIOUR

Alfred Kinsey (1894-1956) is regarded by many as the foremost pioneer in the quantitative study of human sexual activity, having published the results of over 18 thousand personal interviews. Kinsey began as a zoology professor. His interest in sexuality began in 1938 when he presented lectures on the biological dimensions of sex and marriage. In preparing his lecture, he discovered that little research was available on human sexuality. He initially gathered data from students in his classes, concentrating on sexual experiences. He funded his own research and in 1947, he established the Institute for Sex Research. Kinsey published two studies on contemporary sexual behaviour. Firstly, *Sexual behaviour in the human male*<sup>282</sup> which came to be known as the “Kinsey report”. He went on to publish *Sexual behaviour in the human female*<sup>279</sup>. These reports shocked America and many people were surprised to learn that women were comparable to men in their sexual response potential. The reports challenged many myths about sexual behaviour, and revealed findings on taboo topics such as extramarital sex, homosexuality, bisexuality, oral sex, masturbation and prostitution.

Kinsey's samples relied heavily on white, middle class, college-educated Americans of less than 35 years of age. His reports on homosexuality stated that one third of men

and 13% of women had at least one same sex orgasmic experience by age 45. In addition, 90% of men and 62% of women, when questioned, admitted to masturbation. Kinsey demonstrated that many Americans were engaging in sexual activities that may be condemned or considered unnatural at that time. He acknowledged the importance of social and psychological factors in sexuality, relating sexual activity to socio-economic variables such as age, class and religion. The Kinsey interviews gave way to the development of a variety of scales used in further research to explore sexual activity. Despite the usefulness of these tools, questions have been raised concerning the reliability and validity of self-report instruments to measure sexual behaviour. In spite of the methodological problems, behaviour scales provide a useful starting point in the investigation of sexual behaviour and may provide a reasonable sampling of the sexual behaviour domain for adult heterosexual women.<sup>283</sup>

During the period 1960-80, several trends emerged that affected both societal views towards sexuality and the behaviour of individuals. Firstly, non-marital cohabitation became an acceptable pre-requisite to marriage. Secondly, abortion was legalised. Thirdly, attitudes towards homosexuality changed. In America in 1974, it was removed from the classification of mental disorders. This set the stage for advances in the Gay and Lesbian rights movements. Fourthly, there was great innovation in reproductive technologies, for example the world's first test tube baby being born in 1978. Consequential to this sexual liberation, a marked rise in sexually transmitted diseases and the discovery of apparently new ones, such as AIDS, was noted in the 1970s and early 1980s. Television began to explore programmes with sexual themes and at the cinema; movies were becoming increasingly sexually explicit.

### 2.7.2 SEXUAL RESPONSE

In contrast to Freud, and following on from the work of Kinsey, Masters and Johnson focused on the similarity between male and female sexual responses. William Masters was a gynaecologist and Virginia Johnson was a psychology researcher. They teamed up in 1957 to study human sexuality. Rather than ask about sexual activity, Masters and Johnson observed it, in a laboratory setting. They developed tools and procedures to measure the physical responses during masturbation and intercourse of 700 men

and women. Their findings were published in a controversial but influential book in 1966: *Human sexual response*.<sup>280</sup> Masters and Johnson presented sexual activity as natural and healthy, stressing the need for a cooperative attitude between the participants, with each person taking responsibility for his or her own pleasure. They went on to explore sexual difficulties such as premature ejaculation and impotency<sup>281</sup> and their work was seen as crucial to the development of sex therapy. Their research broke new ground and combined with other approaches, still forms the basis of sex therapy today. However, having set out to promote good sex as the corner stone of a relationship between two people, encompassing the broader influential aspects of "being and feeling sexual" as illustrated above, they still focused on the orgasm as vital to sexual satisfaction. As such, their research demonstrated that the penis has no advantage over the hand, tongue or vibrator in providing sexual gratification. This view is summarised by Segal:

With orgasm defined as the single, universal goal of what they call human sexual response, masturbation wins out every time as the most effective means of achieving it! <sup>284</sup>

In addition, the sexual response cycle assumes that the process of sexual arousal will follow a predictable sequence of events each leading to a different physiological stage which can be identified. Although popularized by Masters and Johnson, the concept of stages in sexual pleasure (excitement, plateau, orgasm and resolution) had been described by Ellis 60 years earlier (tumescence and detumescence).<sup>285</sup> In 1974, Kaplan<sup>286</sup> divided the sexual response cycle into three phases – desire, arousal and orgasm. This three phase model forms the basis of current definitions of female sexual dysfunction, as proposed by the American Foundation of Urologic Disease in 1998.<sup>287</sup> Historically, researchers have concentrated on understanding excitement, or arousal. More recently, emphasis has focused on the psychological and behavioural aspects of desire.

Although their earlier research focused on a clinical approach to the observation and categorisation of sexual activity, Masters and Johnson went on to encourage a view of sexuality that was broader than the purely physical. They combined the biological

perspective with elements of sociology and psychology, to define sexuality in much more holistic terms, as outlined by the examples below taken from their book, *Human Sexuality*.<sup>276</sup>

Sexuality is a broadly encompassing term used to refer to all aspects of being and feeling sexual (p5).

Learning about sexuality, is really learning about people and the complexities of human nature (p3).

Sexuality has a broader meaning than sexual activity. It is a dimension of personality rather than a capacity for erotic response (p3).

#### **2.7.2.1 Sexual desire**

Kaplan<sup>288</sup> and Lief<sup>289</sup> expanded the phasic model of sexual arousal outlined by Masters and Johnson. Sexual desire was introduced as the first phase and the term *inhibited sexual desire* used to describe individuals failing to respond to sexual cues. There have been numerous biologically based models and theories attempting to explain sexual desire, most focusing on hormonal influences. At present, it is not clear whether physiological measures such as hormone assays are useful indicators of sexual desire.<sup>283</sup> Whilst it has been suggested that androgen deficiency or lack of Prolactin may contribute to lack of sexual interest, the same author acknowledges that lack of desire can have numerous causes and a woman's sexual feelings are related to her sense of Self, self-esteem, individual boundaries and socio-political factors.<sup>290</sup>

Correlation data suggest that generally, those individuals who are depressed about their sexual functioning tend to have fewer sexual fantasies. Furthermore, when such fantasies occur spontaneously, they are more likely to terminate them due to feelings of guilt.<sup>291</sup> Data from epidemiological studies suggest that women use sexual fantasies to increase desire and facilitate orgasm.<sup>292</sup> Snell and Papini<sup>22;293;294</sup> have likened this aspect of sexual fantasy, to sexual preoccupation, developing a section exploring this within the Sexuality Scale. This sub-scale enquires about sexual thoughts and fantasies. When used on a female only population internal consistency is



high (.88-.91) and 4 week re-test is adequate (.70-.76). This measure of preoccupation is positively correlated with erotophilia (.32) and negatively correlated with anxiety (.36) and sexual guilt (.22). Measures such as these provide useful information on cognitions related to sexuality.

### **2.7.2.2 Sexual excitement**

Sexual excitement can occur in response to either physical or psychological stimuli. In response to sexual excitement, the body undergoes numerous physiological changes including vasocongestion, increased heart rate, a rise in blood pressure and increased respiration rate. In women, the reproductive organs become engorged and may enlarge or change position. Individuals may or may not be aware of these physiologic changes in response to sexual arousal.

The physiological and affective aspects of arousal have been studied. Physiological research tends to have concentrated on measurements of vaginal congestion via vaginal pulse amplitude (VPA) and vaginal blood volume (VBV).<sup>295</sup> The construct of arousal is central to understanding cognitive and affective aspects of sexual excitement in women.<sup>283</sup> Arousability is a cognitive sensitivity to external sexual cues.<sup>296</sup>

Passionate love, defined as an intense longing for union with another, consists of three components:<sup>297</sup>

- Cognitive – preoccupation with the partner
- Emotional – sexual attraction towards the partner
- Behavioural – efforts to maintain closeness and help the partner

Using canonical correlation analysis, the measure of passionate love is correlated with sexual desire and excitement and, for example, interest in engaging in sex with the partner (.34), feelings of sexual excitement (.29)<sup>297</sup> and ratings of sexual satisfaction (.42).<sup>298</sup> Women who have a positive view of themselves as a sexual person, (high sexual esteem) and their ability to become sexually aroused, report higher levels of passionate love and more romantic involvements.<sup>278</sup> Snell and Papini<sup>22</sup> incorporated a measure of sexual esteem into the Sexuality Scale. When used on a female only

population, internal consistency is high (.91-.92) and 4 week re-test is adequate (.69-.74).

Negative emotions may impair sexual excitement. Psychodynamic theory highlighted fear and anxiety in relation to the phallus as a possible reason for impaired sexual excitement. However, there is little scientific evidence to support a hypothesis that anxiety impairs sexual arousal. Masters and Johnson<sup>281</sup> highlighted anxiety as a key factor in arousal failure. However, studies exploring the contribution of anxiety tend to use male subjects and extrapolate findings to a female population. In one study using female participants in a laboratory setting,<sup>299</sup> anxiety was found to actually increase genital arousal (measured by VBV).

### **2.7.2.3 Orgasm**

In order for orgasm to be achieved, the response cycle phases all need to be completed. Previous stages such as desire and excitement would both have a link to the occurrence of orgasm. Evidence suggests that women who report low levels of orgasm reliability were less aware of the physiological changes which accompany arousal than women reporting higher levels of orgasm reliability.<sup>300;301</sup>

### **2.7.2.4 Resolution and global evaluation**

After orgasm, the physiological changes which occurred as a result of excitement, reverse. It is at this point the individual may reflect and assess the sexual experience. This assessment is an affective or attentional process that can influence feelings concerning both the current and future sexual activity.

Global evaluation and general satisfaction with sexual experiences has been investigated. Areas studied include frequency and range of activity, communication, orgasm, and resolution feelings.<sup>283</sup> Work by Snell and Papini<sup>22</sup> also assessed global satisfaction by utilising the sexual depression subscale of the Sexuality Scale. When used on a female only population internal consistency is high ( $r$  .88 to .93) and 4 week test-retest reliability is also high ( $r$ .67 to .76). Validity data and canonical correlation analysis indicates that the sub-scale assesses relevant aspect of sexual depression and correlates with sexual guilt (.25) and general depression (.32).

Cognitive items regarding sexual attitudes and fantasies appear to be related to relationship functioning and sexual satisfaction. In particular, a positive attitude towards oral sex and experimentation seemed to contribute to this relationship.<sup>302</sup>

### 2.7.3 INDIVIDUAL DIFFERENCES

Historically, sexuality was explored within the realms of psychology. Freud hypothesised that it was sexual instincts which drove personality development, with displaced sexual impulses forming a basis for psychopathology. Later, Eysenck<sup>303;304</sup> showed that personality and sexual variables were correlated. His findings suggested that negative emotions such as anxiety, guilt and self-consciousness, formed a deterrent to sexual expression. Other research has shown that women scoring high on neuroticism subscales (anxiety, depression and self-consciousness) reported lower levels of sexual function and poorer body image. No significant difference was found with other personality characteristics such as extraversion, agreeableness or conscientiousness.<sup>305</sup> There has been minimal research into self-views of sexuality (cognitive representations).<sup>283</sup> What has been shown is that women holding a negative view of their sexuality tend to describe themselves as emotionally cold, inhibited and unromantic. These women may display negative attitudes towards aspects of sexuality, describing themselves as self-conscious, embarrassed and lacking in confidence in sexual contexts. Their sexual self-view may be significantly influenced by others, particularly an intimate partner. This influence is less profound in women with a positive sexual self-schema.<sup>283</sup>

### 2.7.4 THE SEXUAL SELF CONCEPT

If the Self is multi-faceted and relationships with others are influential in self-development, then it could be argued that the sexual Self is of particular importance. Historically, research investigating the sexual aspects of Self fell into three traditions. Firstly, there was a concern with differences in affective, attitudinal or evaluative reactions to sexual cues (erotophobia-erotophilia).<sup>306-308</sup> Secondly, sexual behaviour was studied to include individual sociosexual differences, promiscuity and willingness to enter into sexual activities.<sup>309-312</sup> Finally, there was exploration of physiological

aspects such as arousal, and response.<sup>313;314</sup> Cognitive representations of sexuality have received little attention.<sup>315;316</sup> Social cognition research suggests that if a cognitive approach were to be adopted, a variety of sexually relevant domains could be explored, for example attitudes, behaviours and responses in addition to cognitive representations of the sexual Self.<sup>278</sup> Sexual self-schema could then be viewed as generalizations about sexual aspects of oneself, derived from past experience, manifested in current experience, influential in the processing of sexually relevant social information and guiding sexual behaviour.<sup>278</sup>

Andersen<sup>278</sup> presents data from six studies documenting the validity, reliability and feasibility of assessing a woman's cognitive view of her sexual Self. Data collected from seven different samples were gathered over six consecutive academic quarters from American undergraduate women with a mean age of 20 years. Two cohorts of older women included non-faculty university employees, older students and acquaintances of the experimenters. These women ranged from 38 years to 74 years with a mean age of 49 years. Socio-demographic variables such as religion, education, and social class, were not influential on sexual Self schema scores. Andersen<sup>278</sup> continued to investigate sexual schema in further work. Assessment tools included validated instruments to measure sexual arousal,<sup>313</sup> sexual opinions,<sup>307</sup> sexual experience,<sup>317</sup> socio-sexual orientation<sup>311</sup> and global sexual self-rating.<sup>278</sup> Women who experienced positive affects and had sexual activity with an extensive history of sexual and romantic activity, were expected to score positively on the sexual schema. Likewise, those women who were more inhibited, or had negative experiences, were expected to have a negative schema score. Data were collected from 400 undergraduate, unmarried women in the first week of an academic quarter. The results are summarised below and culminated in the Sexual Self Schema Scale. Andersen proposes<sup>283</sup> that a comprehensive investigation into women's sexuality should address sexual behaviour, sexual response and also individual differences.

#### **2.7.4.1 Sexual schema includes cognitive generalizations about the self**

In contrast to women with a negative view of the sexual Self, women with a positive sexual Self schema described themselves as more able to become sexually aroused in response to sexual events. They were also able to evaluate sexual practices more

positively and were more willing to enter into uncommitted sexual relationships. Their global sexual self-rating was higher than that of their negative schema peers.

#### **2.7.4.2 Sexual schema are derived from past experience**

Women with positive schema reported a broader range of lifetime sexual behaviours, more lifetime partners, and an increased number of brief sexual encounters than women with negative schema. Twenty one point five percent of the women reported experiencing sexual exhibition whilst 19.8% reported being sexually touched by a man or older boy, before the age of 12. These experiences did not have a significant impact on sexual Self schema. There was no relationship between negative schema scores and previous negative or traumatic asexual experience.

#### **2.7.4.3 Sexual schema is manifest in current experience**

The same cohorts of women completed the assessments over two time periods, 9 weeks apart. The findings suggest that sexual Self schema are related to stable, behavioural differences in sexual activity.

#### **2.7.4.4 Sexual schemas guides the processing of sexually relevant social information**

Women with a positive self-view anticipated that they would engage with more sexual partners in forthcoming years, than the negative schema group. Positive schema women were more confident about behavioural predictions and sexual futures. Follow up assessment confirmed that positive schema women had in fact had more intercourse, more partners and more brief sexual encounters than the negative schema women. In addition to being confident, they were more sexually active and schema scores effectively predicted these differences.

### **2.7.5 SEXUAL DYSFUNCTION**

Current definitions of sexual dysfunction are based on the physiological components of the female sexual response cycle – desire, arousal and orgasm. Sexual dysfunction encompasses:

- Hypoactive sexual desire and sexual aversion disorders (deficiency of sexual thoughts or receptivity to sexual activity, leading to personal distress)

- Sexual arousal disorder (inability to attain or maintain sufficient sexual excitement that causes personal distress)
- Orgasmic disorder
- Sexual pain disorders, which include dyspareunia and vaginismus

This classification requires that symptoms be severe enough to lead to personal distress.<sup>287</sup> Dysfunction may involve any, or all of the above. The origin may be organic, psychological or of uncertain aetiology. Dysfunction may be primary or secondary to other physical or emotional disorders.

### 2.7.6 SUMMARY

Contrasting group findings indicate that intrapersonal and interpersonal processes are regulated through sexual schema, thus providing evidence to support the aspects of a cognitive representation of the sexual Self. The construct provides a mechanism whereby information about the Self can be processed, affecting emotional properties and influencing behaviour. The studies by Andersen<sup>278;278;283;317</sup> indicate that there are systematic individual differences among women in their view of the sexual Self. This view can not only be measured with reliability and validity, but can also predict future emotions and sexual behaviour. The sexual self-view is a cognitive generalization about sexual aspects of the Self. The view is derived from past experience, manifest in current experience, is influential in the processing of sexually relevant information and guides sexual behaviour.

Sexual schema includes two positive and one negative aspect. Positive aspects are an inclination to experience passionate-romantic emotion and a behavioural openness to sexual experience. Data suggests that for women, these feelings are closely tied to sexual affects. Women consider a “sexual woman” to be one who is passionate as well as loving and romantic,<sup>278</sup> and their sexual self-esteem is derived in part from a sensitivity and inter-dependence with others.<sup>318</sup> The negative aspect concerns emotion, in particular sex guilt, shame, sexual self-criticism, self-consciousness and global sexual depression. These feelings may be a deterrent to sexually orientated behaviour and may inhibit or reduce sexual arousal.

Studies into the Self can certainly be complex. This research will focus specifically on cognitive, affective and behavioural aspects of the sexual Self and how these are affected by urinary or anal incontinence. Put simply, the research will explore the way in which an incontinent woman views her condition, how this impacts on the way she feels about herself and how this influences her behaviour. Some of these aspects are covered in general terms by the Kings Health and Manchester questionnaires. When focusing specifically on the sexual Self and exploring the impact on sexual behaviour, a more specific tool was required. The sexuality scale covers cognitive, affective and behavioural aspects of the sexual Self and as such was ideal for this research.

### 2.7.7 THEORETICAL BACKGROUND FOR THE SEXUALITY SCALE

Central to an individual's thought or cognitions about themselves as a sexual being is the concept of desire. One way to measure desire is to explore sexual preoccupation. These cognitions or thoughts will in turn affect how the individual feels. Feelings include sexual excitement, which is directly influenced by sexual esteem. Also, after the sexual act, there are feelings arising from evaluation. These evaluative feelings can be explored by measuring sexual depression. Combined, the measures of sexual esteem, sexual depression and sexual preoccupation form the Sexuality Scale.

#### **2.7.7.1 Sexual preoccupation**

Preoccupation involves a persistent tendency or obsession with particular behaviours or cognitions. The source of these obsessions is believed to originate in the individuals prior learning or experiences. In the case of sexual preoccupation, these cognitions are sexual or intimate in nature.

#### **2.7.7.2 Sexual esteem**

Sexual esteem is a component of self-esteem. Like self-esteem, it is an evaluative, affective part of the sexual Self. Just as we have "theories" about what other people are like, we also have theories about what we are ourselves, including sexually. The most important aspect in the formulation of these theories is self-esteem.<sup>319</sup> How we perceive ourselves and others will impact on daily living and social interactions. How we relate to those interactions in an intimate relationship can depend on self-esteem. A positive self-regard, or self-esteem, is thus a fundamental aspect of relationships

and central to sexual experiences and perceptions. Sexual esteem as a variable of human sexuality is under-investigated although love, body image, sex education and self-acceptance have been suggested as factors necessary for its attainment.<sup>320</sup>

### **2.7.7.3 Sexual depression**

Low self-esteem is the most important component of depression<sup>319</sup> and as such, the two concepts are inextricably linked. Sexual depression involves a tendency to punish oneself about capability to relate in a sexual way to another. Like self-esteem, personal perception is key in the appraisal of the situation and the individual's part within it.

Snell<sup>321</sup> believes that esteem, depression and preoccupation in reference to sexuality will influence not only behaviour and enjoyment but also a willingness to seek help and discuss the problems encountered. He hypothesises that low sexual esteem and high sexual depression will result in an unwillingness to discuss the intimate nature of the problems encountered.

## **2.8 SEXUALITY DURING PREGNANCY AND AFTER CHILDBIRTH**

The section above outlines the theoretical developments concerning sexuality and the sexual self from a general perspective. However, this research focuses specifically on pregnant women from mid pregnancy to one year after the birth of their baby. It is inevitable that such a large physiological event plus the associated life changes will have an impact upon sexual desire, excitement, orgasm and indeed the sexual self concept. The section below outlines how these aspects are influenced by pregnancy and childbirth.

Coital activity tends to decline during pregnancy. When it does occur, adaptations are often necessary to include change of position and some activities. On average, intercourse resumes 6-8 weeks after delivery.<sup>18</sup> By the third postpartum month, 88-95% of couples have resumed sexual intercourse. In many cases, frequency of coital activity is reduced during the early postpartum months.<sup>322-329</sup>



### 2.8.1 SEXUAL DESIRE

During pregnancy, female sexual interest is variable but overall, tends to decline.<sup>280;326;329-335</sup> Female sexual activity is often motivated out of concern for the need to satisfy her partner's sexual needs.<sup>322</sup> In most cases, female sexual interest is reduced in the first 4 months after delivery, after which time, desire is very variable.<sup>323;325;326;330;332;335</sup>

### 2.8.2 EXCITEMENT

During the first and second trimester, vasocongestion of the genital area during sexual excitement is usually increased. As a result, lubrication and orgasm may be more intense. In the third trimester, there is a generalised vasocongestion which is not altered by sexual excitement. Vaginal contractions during orgasm tend to be weaker and may be associated with cramps.<sup>18</sup>

During the early part of the postpartum period, the walls of the vagina are thinner and arousability may be impaired. This is sometimes exacerbated by breast feeding. During this time, the intensity of the orgasm is usually reduced.<sup>18</sup> By 3 months postpartum, physiological changes have regressed, unless breast feeding has continued, and intensity of orgasm return to normal levels or may be increased.<sup>280</sup>

Sexual responsiveness is still reduced in 40-50% of women 6-12 months postpartum. Interestingly, 20% of partners also experience reduced sexual responsiveness, suggesting that factors other than those purely physiological contribute to the sexual response cycle.<sup>330</sup>

### 2.8.3 ORGASM

Studies comparing female sexual enjoyment before and after pregnancy present contradictory results.<sup>323;324;326</sup> Before pregnancy, 51-87% of women experience orgasm.<sup>279;292;336</sup> Results detailing the frequency and intensity of orgasm during pregnancy are contradictory.<sup>18</sup> By 3-6months postpartum, the rate of orgasm and preferred means of achieving it, have usually returned to the pre-pregnancy state.<sup>18</sup>

Fear of harming the baby during sex in pregnancy inhibits up to half of women and at least a quarter of men. Dyspareunia is also experienced in up to half of women. Other problems include positional difficulties (12-20%), perceived lack of attractiveness (4-20%), and concern about partner satisfaction (35-88%).<sup>18;280;322;326;328;329;331;333;334;336-</sup>

<sup>338</sup> Many couples experience sexual problems postpartum and this can lead to avoidance. However, a quarter of women report intensification of their sex lives postnatally.<sup>18;327;330</sup>

#### **2.8.4 SEXUAL SELF CONCEPT AND CHILDBIRTH**

Many pregnant women feel less attractive. This may in part be secondary to weight gain, which for some, persists long after the baby is born. There are no studies of female perceptions of attractiveness postnatally.<sup>18</sup> Pregnant women's attractiveness as perceived by themselves and their partner has a positive correlation with sexual activity and enjoyment.<sup>334</sup>

Depression and emotional lability in the postnatal period are associated with reduced sexual interest, enjoyment, activity and perceived affection from sexual partner.<sup>325;328;330</sup>

#### **2.8.5 PHYSICAL AND SOCIAL VARIABLES**

Data correlating sexual variables with socio-demographic variables such as education, nationality, duration of relationship, social class, financial situation or work, are contradictory but generally show no significance.<sup>18</sup> There are no correlations between intrapartum events, mode of delivery and sexual interest or enjoyment.<sup>327;330;339</sup>

### **2.9 INCONTINENCE AND SEXUALITY**

Advancement has been made over the past century in the acknowledgement of the various aspects of sexuality, recognising that sexual activity is only one part of it. However, a conceptual reductionism still exists. Studies into human sexuality often focus on biological behaviour, frequency of sexual activity and orgasmic regularity. Whilst psychological and cultural elements are acknowledged, they are rarely incorporated. This research will aim to address that knowledge gap. This section

outlines current knowledge on sexuality and incontinence. In keeping with the format above, the section addresses activity; behaviour and response; and finally sexual self-concept.

### 2.9.1 INCONTINENCE DURING SEXUAL ACTIVITY

Ultrasound shows that penetrative intercourse in humans is associated with considerable displacement of female pelvic anatomy.<sup>340</sup> The anterior bladder wall and lower part of the bladder undergo depression and stretching. This may lead to traumatization of the lower urinary tract structures and post coital urinary symptoms. The introduction of an erect penis into the vagina may displace the bladder neck, disrupting the urinary continence mechanism.<sup>341</sup> In addition, stimulation of the trigone and bladder base may encourage abnormal detrusor contractions resulting in increased intravesical pressures leading to incontinence. A similar effect may occur at orgasm.<sup>342</sup>

Evidence suggests that urinary incontinence occurs to some degree in 11% to 60% of women with SUI during sexual activity.<sup>343</sup> As with other studies into urinary incontinence, the broad prevalence range is likely to be due to methodological variation, population differences and small sample sizes. Several studies have attempted to identify the specific point at which leakage occurs during sexual activity. Leakage appears to be associated with penetration in women suffering from SUI, whereas women with DO or urge incontinence leak during orgasm.<sup>344 345</sup> Whilst urine leakage during sexual activity may lead to initial embarrassment, the long term psychological impact is likely to be of greater significance.<sup>15</sup> Intercourse incontinence may give rise to sexual problems for the woman or her partner, where none previously existed. In addition to incontinence being blamed for the sexual problems, the sexual acts themselves may exacerbate bladder dysfunction secondary to infection or pain.<sup>342</sup> In one study, the only gynaecological factor associated with sexual dysfunction was the presence of SUI<sup>346</sup> There is no data available detailing faecal incontinence during sexual activity in postnatal women.

### 2.9.2 SEXUAL BEHAVIOUR AND RESPONSE

Women with SUI report a number of factors that contribute to a decreased desire to enter into sexual activity. These include loss of spontaneity as they feel the need to wash or dispose of pads prior to undertaking sexual activity; sleeping in separate beds; a general feeling of unattractiveness and concern over odour.<sup>16;17;347</sup> Sexual expression and behaviour are also likely to be affected and manifested in the outward expression of femininity; for example, in terms of clothing choice.<sup>348</sup> A woman's perception of her own sexuality is jeopardized, leading to significant inhibition, which may be exacerbated by the reaction of her partner.<sup>349</sup>

Sutherst reported that 46% of incontinent patients felt their sex life had been adversely affected by their bladder problems<sup>17</sup> with 35% saying that intercourse was less frequent and 12% had ceased sexual activity altogether. In a study by Lam,<sup>12</sup> 6% of incontinent women abstained from sexual intercourse. Other studies of women attending outpatient clinics demonstrate that incontinence adversely affects sexual function.<sup>15 48</sup> In contrast, the minimal evidence detailing sexual activity where anal incontinence is present, report that sexual desire, enjoyment and orgasm ability are not impaired.<sup>16;196;197;233;350</sup>

### 2.9.3 INCONTINENCE AND THE SEXUAL SELF CONCEPT

Although research into incontinence has tended to focus on biological and physical parameters, some attempt to explore sexuality from a psychological perspective has been made. The Kings Health Questionnaire,<sup>19</sup> Incontinence Impact Questionnaire<sup>242</sup> and The Bristol Female Lower Urinary Tract Symptoms questionnaire,<sup>351</sup> are all validated quality of life assessment tools used specifically for urinary incontinence and contain some questions to evaluate the impact of urinary incontinence on sexual relations. Questions tend to be generic and superficial in nature. The Pelvic Organ Prolapse/Urinary Incontinence Sexual Function Questionnaire (PISQ)<sup>352</sup> focuses specifically on urinary incontinence and sexual health and comprises of emotional, behavioural, physical and partner-led domains. Whilst providing useful information, it does not explore generic quality of life domains.

Each person needs to feel desirable as a sexual partner. Sexual self-image is a combination of feeling physically attractive, skilled as a lover and able to satisfy a partners needs.<sup>353</sup> Illness or disability such as incontinence can be devastating, impairing the ability to meet these requirements and devastating self-confidence and body image. Of women presenting with urinary incontinence, frequency or urgency, 40% report feeling less attractive.<sup>16</sup> Women with bladder dysfunction often suffer from poor self-esteem, relationship difficulties, depression and social isolation.<sup>354</sup> The degree of impairment in self-confidence, self-esteem and body image will be influenced by the individual's beliefs and feelings and the reaction of their partner.<sup>353</sup>

## 2.10 DISCUSSION AND DISCLOSURE

Discussion and disclosure are not a main part of this research although some superficial data on this will be collected. Several studies have attempted to investigate the discussion and disclosure of continence issues with health professionals. They all agree that the problem is under-reported and often poorly managed. Some studies have attempted to identify barriers which prevent women discussing incontinence. Key themes emerge and include a belief that the condition isn't that bad, that the treatment won't work, and that patients suffer embarrassment.

During telephone interviews with 851 women, only one in three women with regular incontinence had sought help. Of those who did not seek help, 81% did not see it as abnormal and 10% had low expectation of benefit from treatment.<sup>355</sup> Similar disclosure rates were found in other studies.<sup>356</sup> Forty percent of women with urinary incontinence delay seeking treatment due to embarrassment.<sup>16</sup> This reluctance to seek help can have severe repercussions not only for a person's basic health, but for their quality of life. Incontinence is often seen as a normal part of aging or part of the normal sequelae of childbirth.<sup>357</sup> The majority of postnatal women are not provided with any information on incontinence although many would like some.<sup>358</sup>

In a large UK incontinence study, a quarter of a million postal questionnaires were sent to community-dwelling men and women. Many women were embarrassed to discuss their urinary symptoms. Their first professional contact, usually with their GP,

was often disappointing, with 30% being told to return if symptoms got worse and 26% being given antibiotics even though there was no other sign of infection.<sup>359</sup>

In a review of current literature, Wilson<sup>111</sup> suggests that half of older adults who have urinary incontinence initiate self-treatment rather than consult health care providers. Most adults initiate behavioural, dietary or environmental modifications. Protective pads and clothing are also used to prevent their condition being disclosed.

The majority of people with faecal incontinence do not present for, or receive professional help.<sup>213 53</sup> In symptomatic postnatal women, only 14% sought help, most believing that either their condition was not severe enough, nothing could be done for them or it would get better.<sup>179</sup>

In summary, urinary and anal incontinence is not usually disclosed to health professionals by women. This is predominantly due to a lack of information leading to the misconception that the condition is normal and untreatable. When disclosure does take place the advice and treatment offered may be inappropriate.

## **CHAPTER 3 DESIGN AND METHOD**

### **3.1 INTRODUCTION**

The research design was primarily a postal survey using a total of five data sources. These were:

- The Kings Health Incontinence Questionnaire.<sup>19</sup>
- The Sexuality Scale.<sup>21</sup>
- The Manchester Anal Incontinence Questionnaire.<sup>20</sup>
- Free text and semi structured qualitative questions.
- Obstetric information retrieved from patient case notes.

This longitudinal prospective study collected data from patients at four time intervals, ranging from the last trimester of pregnancy to one year postnatally. The first three time intervals utilised the Kings Health Incontinence Questionnaire<sup>19</sup> and the Sexuality Scale.<sup>21</sup> At one year, the Manchester Anal Incontinence Questionnaire<sup>20</sup> and qualitative questions were added. These data were combined for analysis.

The purpose of the design was to correlate the scores from both the urinary and anal incontinence questionnaire with those from the sexuality questionnaire, as well as to establish perceptions and experiences concerning disclosure of continence problems. In addition, these results would be correlated with obstetric information to explore causative or predictive factors for incontinence. This analysis aimed to look for associations between the groups of data and the variables.

This chapter will provide a detailed description of the research design and method. This will include an account of the concepts and opinions that were considered following discussion with relevant professionals and user groups. An explanation will be given as to how these opinions influenced the eventual design and method of the research.

After identification of the variables and correlates, the research problem and hypotheses, this chapter will continue by offering an explanation for the chosen study design and method. The setting, population and sample size will be described in detail. Following on from this, the research tools will be justified highlighting their suitability for this research. A consideration of ethical issues will be offered. This will include establishing an appropriate method of referral for those patients experiencing incontinence or sexual difficulties. Finally, implementation and pilot group data will be summarised.

## **3.2 THE RESEARCH PROBLEM**

**What are the obstetric, maternal and fetal factors that increase the risk of postnatal urinary and anal incontinence and how do these conditions affect female sexuality and quality of life? Do women seek help when continence problems exist?**

## **3.3 VARIABLES AND CORRELATES**

In order to answer the research problem above, a number of specific pieces of information would need to be collected. This information can be divided into six groups of variables:

1. Degree of incontinence (urinary, anal and faecal).
2. Sexual esteem, sexual depression and sexual preoccupation.
3. Quality of life domain scores (discussed in greater depth below)
4. Obstetric variables: gestation at delivery, spontaneous or induced labour, method of induction, duration of labour, epidural anaesthesia, Intrapartum catheterisation, duration since bladder last emptied at onset of second stage, mode of delivery, retained placenta, perineal trauma, sutures.
5. Maternal and fetal variables: age, Body Mass Index (BMI), smoking, presence of a partner, sex of partner, fetal variables: birth weight, method of feeding.
6. Information on disclosure to health professionals or partner to include free text responses.



Having identified the information required, the research problem will be addressed as follows:

**What are the obstetric, maternal and fetal factors that increase the risk of postnatal incontinence?**

Quantitative studies such as this aim to identify how a variable might be related to an outcome. Essentially, they are concerned with covariance and possible cause and effect. Initially, the obstetric, maternal and neonatal variables formed the independent, (or causal) variables with the degree of incontinence the dependent (or effect) variable. This enabled the initial part of the research question to be addressed.

**How does this condition affect female sexuality?**

In order to answer the second part of the research question, the degree of incontinence became the independent variable (cause), and the sexuality scores were the dependent variables (effect).

**Do women seek help when continence problems exist?**

This final part of the research problem will be answered by analysis of information relating to disclosure to health professionals or partner. Much of the information will be in the form of free text responses and key themes will be identified.

From this research problem, several questions can be identified:

### **3.4 RESEARCH QUESTIONS**

- i. What is the prevalence of postnatal urinary incontinence in this population?
- ii. What is the prevalence of postnatal anal incontinence in this population?
- iii. Are there any obstetric, maternal or fetal variables that will influence the prevalence rates and degree of urinary and anal incontinence postnatally?
- iv. What is the impact of incontinence on quality of life?
- v. What are the relationships between urinary incontinence and female sexual esteem, sexual preoccupation and sexual depression?
- vi. What are the relationships between anal incontinence and female sexual esteem, sexual preoccupation and sexual depression?

- vii. Do continence problems impact on intimate relationships?
- viii. Do women discuss continence problems with health professionals? If so, how do they perceive their experiences?

These research questions give rise to the following hypotheses:

### 3.5 HYPOTHESES

- i. There is a positive relationship between childbirth and incontinence of urine as measured by the Kings Health Questionnaire.<sup>19</sup>
- ii. There is a positive relationship between childbirth and anal incontinence as measured by the Manchester Health Questionnaire.<sup>20</sup>
- iii. There are identifiable obstetric, fetal or social factors that contribute to the risk of anal and urinary incontinence. These include: age, BMI, birth weight, duration of labour, bladder emptying in labour, mode of delivery, feeding method, induction of labour, epidural anaesthesia, smoking and perineal trauma.
- iv. Incontinence has a detrimental impact on quality of life as measured by both the Kings Health<sup>19</sup> and Manchester Questionnaires.<sup>20</sup>
- v. Urinary incontinence as measured by the Kings Health Questionnaire<sup>19</sup> has an adverse effect on female sexuality measured using the Sexuality Scale.<sup>21</sup>
- vi. Anal incontinence as measured by the Manchester Health Questionnaire<sup>20</sup> has an adverse effect on female sexuality measured using the Sexuality Scale.<sup>21</sup>
- vii. Incontinence has an adverse impact on intimate relationships as measured on the relationship domain of the Kings Health and Manchester questionnaires, free text responses and the Sexuality Scale.
- viii. Women do not discuss continence or sexuality problems with health professionals.

### 3.6 NULL HYPOTHESES

- i. Childbirth is not associated with urinary incontinence, as measured by the Kings Health Questionnaire.<sup>19</sup>

- ii. Childbirth is not associated with anal incontinence, as measured by the Manchester Health Questionnaire.<sup>20</sup>
- iii. There are no identifiable obstetric, fetal or social risk factors for anal or urinary incontinence.
- iv. Urinary or anal incontinence does not adversely affect quality of life domain scores, as measured by both the Kings Health<sup>19</sup> and Manchester questionnaires.<sup>20</sup>
- v. There is no significant difference in reported sexuality problems, as measured by the Sexuality Scale,<sup>21</sup> between women who are continent and those who are incontinent of urine as measured by the Kings Health Questionnaire.<sup>19</sup>
- vi. There is no significant difference in reported sexuality problems, as measured by the Sexuality Scale,<sup>21</sup> between women who are continent and those who have anal incontinence as measured by the Manchester Health Questionnaire.<sup>20</sup>
- vii. Continence problems do not have an adverse impact on intimate relationships.
- viii. Women who have concerns about their continence will access health care and seek help for their problem. When help is sought from health care professionals, the advice received is perceived as helpful and appropriate.

### 3.7 AIM

Large numbers of women every year may become incontinent as a consequence of childbirth. The financial cost of clothing, sanitary protection, toiletries and the long-term health implications are important considerations. However, the cost to the social and psychological well being of the woman, her partner and ultimately her family are of fundamental importance.

This research did not explore the physiological and neurological processes associated with pregnancy and childbirth. However, it did aim to identify the prevalence of urinary incontinence in pregnancy and the first year postnatal, to identify the prevalence of postnatal anal incontinence, to explore disclosure of incontinence problems to health professionals and finally, to examine how incontinence impacts on sexual esteem, sexual depression and sexual preoccupation.

Having identified the importance of interpersonal communication and relationships to self-esteem and self-perception and their impact on sexuality, it must be acknowledged that the contribution of the partner in the relationship is fundamental. However, this research focused solely on the woman and her perception of her sexuality. The feelings of her partner, whilst contributory, were not evaluated here.

### **3.8 STUDY DESIGN AND METHOD**

As summarised in the introduction to this chapter, the research design included a postal survey and utilised five data sources. The data gathering tools are discussed at length in Section 3.11.

This longitudinal prospective study collected data from 516 patients during the last trimester of pregnancy, 6 weeks postnatal, 6 months postnatal and one year postnatal. At each of the first three time intervals this data provided information on:

- Urinary incontinence symptoms and the impact of such symptoms on quality of life, utilising the Kings Health Questionnaire.<sup>19</sup>
- A measure of sexual esteem, sexual preoccupation and sexual depression, utilising the Sexuality Scale.<sup>21</sup>

The forth time interval at the one year postnatal point, provided information on urinary incontinence and sexuality as above, plus:

- A measure of anal incontinence symptoms and the impact on quality of life, utilising the Manchester Health Questionnaire.<sup>20</sup>
- Qualitative data on disclosure patterns, perceptions and experiences. This data was gathered using qualitative questions and a free text section.

Given that the same questionnaire was given to the same patients, on four occasions over a period of 18 months, it was also possible to determine if incontinence was progressive - getting worse, or regressive - getting better. Other studies have highlighted the transient nature of urinary incontinence in the first few months after childbirth.<sup>41</sup> This long term follow-up enabled conclusions to be drawn concerning the progressive or regressive nature of the condition. The anal incontinence questionnaire was only included at the one year stage, as it was felt that the total volume of

questions would have an impact on response rate if it was included throughout the earlier stages of the research. In addition to these data sources, the patient case notes were obtained. The Intrapartum care record was read in full and various obstetric variables collated onto a proforma.

### 3.8.1 INITIAL DESIGN

Initially, it was intended to identify patients who had a continence problem in the early postnatal period and follow up just these patients for one year. The remaining patients would be excluded from further follow up.

On discussion with various professionals it was suggested that the perception of what was normal and acceptable to patients may vary over time. Someone with mild urine leakage at 6 weeks postnatal may consider this normal but the same volume of leakage at 12 months may not be seen in the same way. Thus, some patients who perceived themselves to be incontinent at one year may have been excluded from follow up, as they did not perceive themselves to have a continence problem in the early postnatal period. By including all patients in the study and following them all up for one year, it may be possible to ascertain if the problem is getting better with time or getting worse.

Initially, it was intended to undertake semi-structured interviews with all patients reporting incontinence at one year to provide greater depth and explore access to health services in relation to this condition. Feedback from patient representative groups and patients themselves suggested that this might not be feasible or acceptable for several reasons. These included the reluctance to discuss such intimate details with the researcher in the presence of a young child; the possibility that the patient may have returned to work and be unable to spare the time; the duration of time involved for the researcher; and the possibility that the patient's family may be unaware of the condition. It was therefore decided to provide a free text section and amend some of the preliminary questions on the final questionnaire. This would give an opportunity for some measure of qualitative information to be obtained in a less obtrusive and more economical way.

### **3.8.2 CONSULTATION**

Consultation took place over a period of 6 months, during which time the research design and method were amended, taking into account the feedback received. The consultation process aimed to include patients, professionals and researchers.

#### **3.8.2.1 Patient consultation**

Random selections of antenatal patients were given the proposal and questionnaires to read and comment upon. Patient representative and advisory groups were also invited to comment. These included the Maternity Services Liaison Committee (MSLC), Maternity Action Group (MAG) and the National Childbirth Trust (NCT).

#### **3.8.2.2 Consultation with Health Professionals**

The draft research proposal was issued to all midwives, obstetricians and gynaecologists working in the unit where the study was carried out. Professional consultation was then extended to include specialists in colorectal surgery, including a meeting with Mr. E. Kiff, and correspondence with Mr. G. Bugg, authors of the anal incontinence questionnaire. Invaluable feedback was obtained and extensive changes made following this important input. In addition, advice was sought from specialists from urogynaecology and medicine for the elderly who had particular interest and research experience in the study of incontinence. Physiotherapists are often involved in the treatment of incontinence and extensive discussion was undertaken with a representative from this professional group.

#### **3.8.2.3 Consultation with researchers**

In addition to the advice of the PhD supervisors, consultations took place with a number of researchers. Statistical advice was obtained from the hospital statistician. Further consultation included the Head of the Hospital Clinical Practice Research Unit. Further advice was sought from the hospital informatics team to establish the feasibility and practicality of identifying patients for recruitment and ensuring compliance with confidentiality guidelines. Once the final design had been established, the full research design and protocol was sent to Dr. Snell, designer of the

Sexuality Scale,<sup>21</sup> and his opinion sought. He offered his full support and confirmed that the sexuality tool was an appropriate tool for this research.<sup>360</sup>

### **3.8.3 FINAL DESIGN AND METHOD**

The questionnaires were posted at approximately 30 weeks gestation, 6 weeks postnatally, 6 months postnatally and finally at one year postnatally.

#### **All questionnaires were colour coded:**

Blue - antenatal, last trimester. Urinary incontinence and sexuality.

Yellow - 6 weeks postnatal. Urinary incontinence and sexuality.

Pink - 6 months postnatal. Urinary incontinence and sexuality.

Green - one year postnatal. Urinary incontinence and sexuality, plus disclosure.

Purple - anal incontinence questionnaire. Posted once only, at the one year point.

#### **3.8.3.1 Antenatal questionnaire (blue)**

Patients received a blue questionnaire, letter of invitation, information leaflet and prepaid envelope when they were about 28 - 30 weeks gestation. After 2 weeks, those who had not replied were sent a reminder letter, questionnaire, information leaflet and prepaid envelope again. After 2 further weeks, where possible, those who had not replied were telephoned.

#### **3.8.3.2 Six weeks postnatal questionnaire (yellow)**

Postnatally, all patients with the exception of those who stated that they did not want to take part in the study, or those who were excluded due to maternal or fetal reasons, were sent a yellow questionnaire. After 2 weeks, a reminder was sent as above. Patients were not telephoned at this stage. Those who did not respond after the reminder letter, and had not previously indicated that they wanted to be in the study, were excluded from further follow up.

#### **3.8.3.3 Six months postnatal questionnaire (pink)**

Those patients who completed initial questionnaires remained in the study until one year after their baby was born. The pink questionnaire was sent out 6 months after the

birth of their baby. If not returned within a month, patients were telephoned and reminded.

#### **3.8.3.4 One year postnatal questionnaire (green and purple)**

The green questionnaire was sent out accompanied by the purple, anal incontinence questionnaire at the one-year postnatal point. Again, this was followed by a reminder phone call if the questionnaires were not returned within a month.

#### **3.8.4 SUMMARY OF METHOD**

First time mothers were recruited and given incontinence and sexuality questionnaires at approximately 30 weeks gestation. Those who did not reply were given a second chance to join the study 6 weeks postnatally.

The questionnaires were repeated postnatally 6 weeks, 6 months and finally a year after the baby had been born. The final questionnaire enquired about their interaction on this subject with health professionals. Also at one year, they were sent a questionnaire to ascertain symptoms of anal incontinence.

The incontinence and sexuality data were collated, and combined with demographic and obstetric information, in order to address the research questions identified above.

On a weekly basis, hospital records were checked to identify patients who needed to be excluded, for example those who had had a stillbirth, neonatal death, maternal admissions to intensive care or severe fetal abnormality.

### **3.9 SAMPLE SIZE**

As long term prevalence data for urinary and faecal incontinence remains controversial the number of patients required for statistical analysis was difficult to calculate. Furthermore, due to the conceptual reductionism in the majority of research equating sexuality to sexual activity, the long term influence of childbirth on female sexuality remains unknown. The research thus aimed to recruit all women having their first baby during the course of one year.



In order to reduce obstetric and social variables, the research only recruited women who had no previous children and were not suffering from any medical condition that might predispose them to continence problems. The patients who planned to have their obstetric care provided by a specific District General Hospital Maternity Unit, over a period of one year, were invited to take part. Information leaflets explaining the research were issued to eligible patients following confirmation of a normal routine ultrasound scan at 20 weeks gestation.

As a guide, in 2001, the year prior to implementation of this research, there were 3,078 live births at the hospital where the research was undertaken. 1,337 of these were to first time mothers and so possibly eligible for inclusion in the research. After exclusions, it was estimated that 1 thousand women would be invited to take part, and be involved in the research for a period of approximately a year and a half.

Whilst the research was only conducted in one geographical area, it is expected that the results on incontinence prevalence and contributory factors could be applied to any society where similar obstetric and midwifery practices take place within a comparable demographic population.

As stated above, the phenomenon of sexuality varies with culture and time, being reliant on the political, social and personal circumstances at a particular point in time. As such, the results from this research could not be extrapolated to other societies and will be relevant to a specific culture at a given point in time. However, the information obtained will provide a general insight into sexuality and the impact that certain life events can have upon it.

### 3.9.1 OTHER STUDIES

Few long-term studies into the prevalence of postnatal incontinence have been completed. Studies that continue for long follow-up periods tend to have a smaller sample size. Sample size for studies of primigravidae, with a one year follow up time, range from 53<sup>2</sup> to 470.<sup>46</sup>

### 3.10 EXCLUSIONS

The following patients were excluded from the research:

- ✱ Patients who had been pregnant before.
- ✱ Patients who experienced an intra-uterine fetal death, early neonatal death or stillbirth.
- ✱ Patients who had a medical condition or disability that may affect their continence state.
- ✱ Any pre-existing bladder or bowel problem
- ✱ Patients who had a significant fetal abnormality identified at the routine 20 week ultrasound scan or later.
- ✱ Severe maternal illness requiring intensive care.

### 3.11 DATA COLLECTION AND RESEARCH TOOLS

The research instruments used are devices for measuring the variables of interest. Psychometric validation is the process by which such instruments are assessed for reliability and validity.<sup>31</sup> Reliability refers to the reproducibility and consistency of the instrument. Validity is an assessment of whether an instrument measures what it aims to measure. The two measures are inter-related and mutually dependent.<sup>31</sup> There are several components to consider when choosing a research tool.

#### 3.11.1 VALIDITY

##### **3.11.1.1 Measurement validity**

Face validity: In the investigators opinion, do the questions appear to be relevant, reasonable, unambiguous and clear? Other people with experience or expertise in the relevant field may support this opinion.

Content validity: A judgement about the extent to which the content of the instrument appears to examine logically in a balanced way, the full scope of characteristics it is intended to measure.

**Criterion validity:** Criterion validity often involves correlation with another accepted, valid instrument. Two aspects are considered. **Concurrent validity:** the independent corroboration that the instrument is measuring what it intends to measure. **Predictive validity:** Is the instrument able to predict future changes in the variables?

**Construct validity:** Corroboration that the instrument is measuring the underlying concept. The scale should correlate with related variables (convergent validity) and should not correlate with dissimilar variables (discriminant validity). Convergent validity is increased if the same concept is measured using a different method and the results of the two methods correlate.

**Precision validity:** The ability of the instrument to detect small changes.

**Sensitivity:** The ability to identify those people with a condition, and the ability of the graduations of the scale to reflect changes in their condition.

**Specificity:** This refers to the instruments discriminative ability or "false positive rate". The ability of the tool to ensure that people who are not affected by a condition, test negative on the tool.

#### **3.11.1.2 Internal validity**

How confident can we be that the independent variable really is at least in part responsible for the variation that has been identified in the dependent variable?<sup>361</sup>

#### **3.11.1.3 External validity**

This concerns whether the results can be generalised beyond the specific research context. External validity is reliant on the experimental sample being representative.

#### **3.11.1.4 Ecological validity**

This relates to whether the findings are applicable to people's everyday, natural social settings.<sup>361</sup> The more a social scientist intervenes in a natural setting; the more likely it is that the results will be ecologically invalid.

Both the Kings and Manchester Health Questionnaires utilise Short Form 36 (SF-36)<sup>362</sup> during validity testing. Several medical organisations recommend its inclusion as the generic core in disease specific health related quality of life tools.<sup>31</sup> The SF-36 has rapidly become the generic, multi-dimensional health status measure of choice.<sup>31</sup> World wide results report favourably on the psychometric properties of the instrument.

### **3.11.2 RELIABILITY**

#### **3.11.2.1 Internal reliability**

When multiple item measures are aggregated to form an overall score, there is a possibility that there is a lack of coherence. One way of testing this coherence is the "split half" method. The questions relating to a particular measure are divided in half to give two smaller groups. The calculation of the correlation of scores for each of the two halves will give a coefficient value between 0 and 1. A result of .8 and above is a desirable level of internal reliability,<sup>363</sup> and a value of .7 is deemed acceptable. Cronbach's alpha is a commonly used measure of internal reliability. It calculates the average of all possible split half reliability coefficients.

#### **3.11.2.2 Stability**

The test-retest method is a measure of reliability. A strong correlation between the initial results and the retest results, without a change in circumstances, would indicate stability of the research tool.

#### **3.11.2.3 Inter-observer consistency**

Inter-observer consistency is important when subjective measures or observations are being recorded and there is a possibility of lack of consistency in decisions.

### **3.11.3 FEASIBILITY**

The feasibility of a proposed study should be assessed at an early stage. Considerations need to be given to issues such as cost, resources, implementation, equipment and materials.

### 3.11.4 URINARY INCONTINENCE SYMPTOMS

The Kings Health Questionnaire<sup>19</sup> is a validated tool used to assess urinary incontinence and its impact on quality of life. It was developed in 1997 under the direction of Professor L. Cardozo, department of urogynaecology, Kings College Hospital, London. It is a 21 item self report questionnaire.

The first two items of the questionnaire explore perception of general health and the perceived impact of incontinence on aspects of life. Respondents indicate how they perceive their general health and how much they think their incontinence impacts on their health.

This is followed by a symptom index, divided into 10 sub-sections. Symptoms are described and patients are asked to indicate how much they are affected by them on a three point scale (a little, moderately, a lot). If no symptoms are experienced, this question is left blank. This symptom scale does not form part of the scoring, but acts as a guide to the health professional to build up a picture of the patients' condition and urodynamic diagnosis.

The remaining 18 items explore the impact of urinary incontinence on quality of life in relation to six domains: role, physical and social limitations, personal relationships, emotions and sleep. Each item offers a four point scoring system. Respondents are given a graduated score calculated from their replies. Scores in each domain range between 0 and 100. The higher score is associated with the more severe impact in that domain.

Finally, questions are included which explore behaviour undertaken to address the continence problem, such as wearing pads, alteration to diet and embarrassment. This section forms a severity score.

#### **3.11.4.1 Summary of Kings Health Questionnaire scores**

- General health score (max 100)
- Incontinence impact score (max 100)
- Symptom index (not scored)

- QoL domain scores:
  - Role (max 100)
  - Social (max 100)
  - Physical (max 100)
  - Relationship (max 100)
  - Emotion (max 100)
  - Sleep/energy (max 100)
- Severity score (max 100)

#### **3.11.4.2 Validity**

Face validity: The Kings Health Questionnaire appears to present clear, unambiguous, relevant questions. It has been used by several researchers to investigate the impact of urinary incontinence on quality of life.<sup>350;364</sup>

Content validity: Initially, the questionnaire was developed using replies from 1,105 consecutive women attending a urogynaecology clinic. Discussion also took place with health professionals, and incontinent women. In addition, they completed a detailed urinary symptom questionnaire and were asked to document any problems associated with their urinary symptoms, which caused them concern. The most frequently cited concerns were added to the questionnaire. In addition, coping strategies and subjective measures of the severity of their condition were added to the questionnaire. The condition specific quality of life tool used in this research was designed in 1997 following six different pilot studies, which analysed the questions for ambiguity, redundancy of item and ease of comprehension. The final version was posted to 293 women experiencing urodynamic symptoms. In addition, the woman's perception of the severity of her incontinence was measured.

Criterion validity: The questions were chosen from generic questionnaires, condition-specific questionnaires, professional opinion, and feedback from women. Women attending for urodynamic assessment completed a detailed urinary symptom questionnaire and also underwent uroflowmetry, subtracted cystometry and videocystourethrography to establish an accurate urodynamic diagnosis.

Construct validity: As no condition specific tool was available, criterion and construct validity was established by comparison to the UK version of Short Form-36 (SF-36).<sup>362</sup> One hundred and ninety three women completed both The Kings Health and the SF-36 questionnaires. Spearman's correlation coefficients were used to correlate the results. Spearman's Correlation Coefficient between common domain scores on the two questionnaires ranged from -.342 (physical function) to -.648 (general health). There was a highly significant correlation (range  $p < .01$  to  $p < .001$ ) between the common domain scores for the two questionnaires. Both were easy to complete. Predictive validity was not shown.

Precision validity: The Kings Health Questionnaires measures the patients' perception of their condition and the impact it has on their quality of life. As such, precision validity will be reliant on the patients' perception.

Specificity and Sensitivity: Incontinence impact scores were significantly higher for women with detrusor instability than genuine stress incontinence ( $p < .05$ , Mann-Whitney  $U$  test) and significantly lower for women with normal urodynamic investigations than those with other diagnoses ( $p < .01$ , Mann-Whitney  $U$  test).

External validity: The Kings Health Questionnaire is applicable to all settings where urodynamic symptoms, perception of condition and quality of life are to be measured.

Ecological validity: Whilst completing a questionnaire may in itself present an unnatural situation, postal surveys enable participant to remain in their own, familiar environment without influence from a researcher. As such, they may have greater ecological validity than formal interviews.

#### **3.11.4.3 Reliability**

Internal Consistency: Internal consistency using Cronbach's alpha statistic exceeded the minimum requirements for reliability in all domains of the questionnaire. Results ranged from .725- .892. ( $p < .01$ )

Stability: On hundred and ten of the women were asked to complete the questionnaire for a second time to measure test-retest reliability. Results were analysed using Spearman's rho nonparametric correlation coefficient ( $Rho=.80-.96$ ). All results were significant ( $p<.01$ ).

#### **3.11.4.4 Feasibility**

The Kings Health Questionnaire is a valid, reliable condition specific questionnaire that is acceptable to women and has been designed with pregnant and post natal women in mind. As such, it is ideally suited for this research. The tool is easy to obtain, free of charge, easy to complete and relatively short.

#### **3.11.4.5 Other studies using the Kings Health Questionnaire**

The Kings Health Questionnaire has been used in other studies where the validity and reliability of the tool has been confirmed.<sup>37;350;364</sup>

#### **3.11.4.6 Alternatives to The Kings Health Questionnaire**

The Severity Index<sup>365</sup> is a useful tool for assessing the severity of female urinary incontinence. It measures the reported frequency and multiplies this by the amount of urine leakage. This gives a crude indicator of severity of the condition but it does not explore quality of life issues.

The Symptom Severity Index<sup>366</sup> is a symptom assessment tool focusing specifically on stress incontinence.

The Incontinence Screening Questionnaire (ISQ)<sup>92</sup> was developed as a screening tool for use in General Practice. The questionnaire is based on responses from 89 women. It was accompanied by a 48hour pad test to provide an objective incontinence measure. This questionnaire focuses on the general population and is not pregnancy or postnatally specific.

The Urogenital Distress Inventory (UDI)<sup>367</sup> is a validated questionnaire that assesses lower urinary tract symptoms, including incontinence. It has been used to study



symptoms in women and men. There are eight questions. All of the above tools focus on symptoms but neglect quality of life issues.

The Incontinence Impact Questionnaire (IIQ) <sup>368</sup> is a psycho-social tool which measures the impact of urinary incontinence on activities, roles and emotional states. It is designed to explore ways in which urinary incontinence interferes with activities, roles and emotional states. It does not distinguish between overall quality of life, and health related quality of life.

The Bristol Female Lower Urinary Tract Symptoms Questionnaire<sup>351</sup> (LUTS) uses a five point Likert scale for the reporting of a range of urinary symptoms and their perceived impact as well as pad usage and quality of life. It consists of 34 questions. Whilst considered validated, correlations between symptomatic complaints and urodynamic diagnosis is poor. This may be due to individual question interpretation, a potential problem with many of the questions in this questionnaire.

The I-QoL questionnaire<sup>369</sup> provides a subjective assessment of quality of life in relation to urinary incontinence and its treatment. It is often used in clinical trials and measures avoidance behaviour, psychological impact and social embarrassment.

The York Incontinence Perception Scale (YIPS)<sup>370</sup> is based on cognitive social learning theory of control and well-being and only measures psychological aspects.

#### 3.11.5 ANAL INCONTINENCE SYMPTOMS

The Manchester Health Questionnaire<sup>20</sup> is based on the same principals as the Kings tool, but has been adapted and validated for anal incontinence.<sup>20</sup> This condition specific Quality of Life tool was designed in 2001 following collaboration between an Obstetrician (Mr. G. Bugg), a Consultant Colo-Rectal Surgeon (Mr. E. Kiff) and a Physiologist (Mr. G. Hosker). It is a 32 item self report questionnaire.

As with the Kings questionnaire, the first two items of the questionnaire explore perception of general health and the perceived impact of incontinence on aspects of life.

This is followed by a 10 item symptom and severity index. Symptoms are described and patients are asked to indicate how much they are affected by them on a five point scale (never, occasionally, sometimes, most of the time, all of the time). This symptom scale does not form part of the score, but acts as a guide to the health professional to build up a picture of the patients' condition.

The remaining 19 items explore the impact of anal incontinence on quality of life in relation to six domains: role, physical and social limitations, personal relationships, emotions and sleep. Each item offers a five point scoring system. Respondents are given a graduated score calculated from their replies. The higher score is associated with the more severe impact in that domain.

Questions are included which explore behaviour undertaken to address the continence problem, such as wearing pads, alteration to diet and embarrassment. This section forms a severity score.

Finally, a free text section is included for patients to make any relevant comment.

#### **3.11.5.1 Summary of Manchester Health Questionnaire Scores**

- General health score (max 100)
- Incontinence impact score (max 100)
- Symptom index (not scored)
- QoL domain scores:
  - Role (max 100)
  - Social (max 100)
  - Physical (max 100)
  - Relationship (max 100)
  - Emotion (max 100)
  - Sleep/energy (max 100)
- Severity score (max 100)

### 3.11.5.2 Validity

Face validity: The Manchester Health Questionnaire appears to present clear, unambiguous and relevant questions.

Content validity: Initially, professional opinion was sought to determine if the questions would generate the information required. It was then sent to 15 women with no faecal incontinence. Following feedback and subsequent revision, this procedure was repeated. After three cycles, no further amendments were required. The questionnaire was then sent for opinion to 10 physiotherapy tutors. Next, 15 patients with known faecal incontinence completed the questionnaire and were subsequently interviewed to give feedback as to whether the questionnaires presented a true reflection of their condition. Finally, 15 women who had recently given birth and were not known to have faecal incontinence symptoms completed the questionnaire. The questionnaire was also pre-tested by 20 midwives.

Criterion and Construct validity: As no suitable condition-specific tool exists for measuring anal incontinence and quality of life, the UK version of SF-36 was again used for comparison to establish criterion and construct validity. Each item on the Manchester questionnaire was derived from the Kings Health questionnaire. The patients used in the study had all been previously investigated for anal incontinence. In total, the questionnaire incorporates the results from 220 women with known anal incontinence. Patients completing the questionnaires were also interviewed by a faecal incontinence nurse specialist to establish if the questionnaire presented an accurate representation of their problems.

One hundred and fifty nine women completed both questionnaires. Pearson correlations were modest to strong depending on the domain. Criterion validity scores ranged from -.35 (energy) to -.77 (general health). Convergent validity scores ranged from .3 (general health) to .6 (energy). There was a highly significant correlation between the domain scores for the two questionnaires ( $P<.01$ ).

Convergent validity was also confirmed by the correlation between the items relating to faecal incontinence on the symptom scale and the quality of life domains. The

authors hypothesised that the more severe the incontinence symptoms, the higher the scores will be on the quality of life domains.

**Precision validity:** The Manchester Health Questionnaire measures the patients' perception of their condition and the impact it has on their quality of life. As such, precision validity will be reliant on the patients' perception.

**Internal validity:** There was a correlation between faecal incontinence and quality of life scores using both the Manchester and SF- 36 tools.

**External validity:** The tool was developed using a broad age range (28-85yrs) and a variety of incontinence symptoms. Responses were well distributed throughout all response categories.

**Ecological validity:** Whilst completing a questionnaire may in itself present an unnatural situation, postal surveys enable to participant to remain in their own, familiar environment without influence from a researcher. As such, they may have greater ecological validity than formal interviews.

#### **3.11.5.3 Reliability**

**Internal Reliability:** Internal consistency was measured using Cronbach's alpha statistic and exceeded the minimum level in all domains of the questionnaire. Results ranged from .73-.91.

**Stability:** Test-retest reliability was measured by sending the questionnaire again 2 weeks later. Pearson correlation was used to measure the differences between tests one and two. The correlation range was .81-.93. All results were significant ( $p<.01$ ).

#### **3.11.5.4 Feasibility**

The Manchester Health Questionnaire is a valid, reliable condition specific questionnaire that is acceptable to women and has been designed with pregnant and post natal women in mind. As such, it is ideally suited for this research. The tool is easy to obtain, free of charge, easy to complete and relatively short.

### 3.11.5.5 Alternatives to The Manchester Health Questionnaire

The Faecal Incontinence Quality of Life Scale (FIQL)<sup>245</sup> comprises of 29 questions measuring four sub scales: life style, behaviour, depression and embarrassment. Patients from colon and rectal surgery clinics were used during its' development. Research subjects were a mixture of males and females. Some were known to have faecal incontinence (n=118). A control group of symptom free patients were also recruited (n=72). Like in The Manchester Questionnaire, SF-36 was used for comparison. Cronbach's alpha statistic exceeded the minimum level (.8-.96). The questionnaire does not attempt to measure the degree of incontinence.

The Wexner scale<sup>371</sup> is a simplified index, using a 20 point scale that correlates with the FIQL above. It is a potential screening tool providing a crude symptom index, but fails to explore quality of life issues. A high score is said to correlate with impairment in quality of life suggesting confinement at home.

Other studies exploring anal incontinence have used non-validated questionnaires.<sup>58;65;69;113</sup>

Both The Manchester Health Questionnaire and The Faecal Incontinence Quality of Life Scale are similar in length, validity and reliability. However, The Manchester Questionnaire also measures symptom severity. In addition, it is based on a larger, local population.

### 3.11.6 SEXUALITY

The term sexuality is ambiguous and difficult to define. Whilst it certainly incorporates gender and sexual activity, self-perception and social interaction are also essential components, which are often overlooked.<sup>372</sup> When considering sexuality, private perspectives, personal experiences, and social sources will combine to influence the individual. As the literature review illustrates, studies into human sexuality, often focus on biological behaviour, frequency of sexual activity and orgasmic regularity. Whilst psychological and cultural elements are acknowledged, they are rarely incorporated.<sup>373</sup> This research aimed to address this deficit by exploring the psychological aspects of sexuality with particular reference to sexual esteem, sexual depression and sexual preoccupation. Whilst biological and

physiological components may contribute to psychological well being, these elements will not be explored here.

The Sexuality Scale<sup>21</sup> is an objective, self report instrument designed to measure three aspects of human sexuality previously defined: sexual esteem, sexual depression and sexual preoccupation. The tool was initially developed in 1989 and revised in 1992. Professor W.E. Snell Jnr. Professor of Psychology at Southeast Missouri State University and expert on the study of psychology and personality, with particular interest in sexuality and intimacy, was the principal researcher involved in the design of the Sexuality Scale.

Thirty items are arranged in a format enabling respondents to indicate how much they agree or disagree with a statement. A five point Likert scale is used and answers given a score ranging from +2 to -2. Several items are reverse coded. Three sub-scales are yielded. The items on each sub-scale are summed. Scores for sexual esteem and sexual preoccupation range from -20 to +20. Scores on sexual depression range from -16 to +16. A high score represents greater sexual esteem, sexual depression and sexual preoccupation.

Initially, 209 females and 87 males completed the Sexuality Scale and the Sexual Self Disclosure Scale.<sup>374</sup> From this, a further 265 females and 117 males completed the Sexuality Scale in conjunction with the Sexual Attitude Scale,<sup>375</sup> the Sexual Relationship Scale,<sup>376</sup> the AIDS discussion Scale<sup>293</sup> and the AIDS Empathy Scale.<sup>293</sup> Finally, 47 males and 126 females completed the Sexuality Scale in conjunction with numerous other psychometric tools as outlined in Table 3.2. This process led to the assessment of validity and reliability outlined below.

#### **3.11.6.1 Summary of scores on Sexuality Scale**

- Sexual Esteem -20 to +20 a higher score indicating greater esteem.
- Sexual Depression -16 to +16 a higher score indicating higher levels of depression.
- Sexual Preoccupation -20 to +20 a higher score indicating greater levels of sexual preoccupation.

### 3.11.6.2 Normative data and comparison groups

As sexuality varies with time, culture, experience and life style,<sup>372</sup> a comparison group, or normative data, were not readily available for the subjects in this particular research.

**Normative data:** Normative data was obtained from a sub study involving 30 health professionals. Subjects were a convenient sample and female, continent, had never had children, were sexually active, of a reproductive age and did not have a pre-disposing disability. They completed the Sexuality Scale and returned it to the researcher in a pre-addressed envelope. This sub study was completed alongside the main research, in the same geographical area. Thirty two questionnaires were issued. All were anonymous, so reminder letters could not be issued. Thirty replies were received and these form the normative data set for this research.

**Comparison group:** The experience of childbirth may in itself impact upon sexual esteem, sexual preoccupation and sexual depression. The continent group of respondents were used to provide baseline scores for a pregnant or postnatal population, thus forming a comparison group. The replies from the incontinent group were then compared and evaluated for any statistically significant change.

### 3.11.6.3 Validity testing

**Face validity:** The Sexuality Scale appears to present clear, unambiguous, relevant questions. It has been used by several researchers to investigate the three components identified.<sup>377-381</sup>

**Content validity:** To verify the three conceptual dimensions explored by the Sexuality Scale, each question was subjected to a principal component factor analysis. A three factor solution was specified and rotated to orthogonal simple structure with the Varimax procedure. Sexual esteem factors had an Eigen value of 8.38 with coefficients ranging from .52 to .82. Sexual preoccupation had an Eigen value of 4.75 with coefficients ranging from .41 to .86. Sexual depression had an Eigen value of 1.88 with an average coefficient of .67, although two of the items had a coefficient of less than .2 and thus it was decided to consider them filler items. Factor analysis

confirmed that the items on the Sexuality Scale form three concepts of sexual depression, sexual preoccupation and sexual esteem.<sup>379</sup> In summary, there was considerable factorial-validity evidence for the independence of the three measures of sexual esteem, preoccupation and depression.

Criterion validity: The criterion validity of the Sexuality Scale was examined through the use of Canonical Correlation Analysis. This involves the examination of a possible relationship between two sets of variables. The results were compared initially to those from the Sexual Self Disclosure Scale.<sup>374</sup> Concurrent validation was statistically significant when the Sexuality Scale was compared to the Sexual Self Disclosure Scale. In later studies the Sexuality Scale was compared to numerous personality and behavioural measures, including the Sexual Relationship Scale,<sup>376</sup> Sexual Attitudes Scale,<sup>375</sup> the Locus of Control Scale,<sup>382</sup> the Self Monitoring Scale,<sup>383</sup> the Beck Depression Inventory,<sup>384</sup> the Survey of Heterosexual Interaction,<sup>385</sup> the Sexual Opinion Survey,<sup>386</sup> the Sex Guilt Scale,<sup>387</sup> the Rosenberg Self Esteem Scale,<sup>388</sup> The Sex Anxiety Scale,<sup>389</sup> the Personal Attitude Questionnaire,<sup>390</sup> and the Sexual Awareness Questionnaire.<sup>391</sup> All of these instruments have been previously established as having reliability and validity.<sup>379</sup> The results were highly significant and are summarised in Table 3.1 ( $p < .005$  to  $p < .001$ ).

Construct validity: The scales above were used to measure convergent validity of the sexual depression and sexual esteem subscales with highly significant results  $p < .001$ .

Sexual esteem provides people with a positive approach to sex. As such, the convergent validity of the sexual esteem subscale was expected to be demonstrated by a series of negative correlations between it and measures of sex guilt, sex anxiety, chronic depression and heterosexual anxiety. Also, by positive correlations between it and measures of self esteem, sexual assertiveness, instrumentality, and sexual awareness. Similarly, sexual depressed people feel less positive about themselves and so convergent validity of the sexual depression subscale would be supported by a positive relationship with clinical depression and anxiety plus a negative relationship with self esteem. People who are sexually pre-occupied would possess an obsession with the sexual aspects of their lives. These individuals would report less sex-guilt



and anxiety. In addition, they would encounter greater erotophilia, sexual assertiveness and sexual awareness.

**Precision validity:** The Sexuality Scale aims to measure self-perception of situation and circumstances in relation to aspects of the sexuality of an individual. As such, precision validity will be reliant of the ability of the individual to reflect on their feelings and relationships with honesty and accuracy.

Instrument	Sub-scale/factors measured	Sexual esteem	Sexual depression	Sexual preoccupation
Sexual Relationship Scale <sup>376</sup>	Communal approach	0.26d	-0.11a	0.26d
	Exchange approach	-0.14a	0.15b	0.17c
Personal Attributes Questionnaire <sup>390</sup>	Instrumental (can make decisions easily)	0.21a	0.22b	-0.10
	Expressive (warm relationship with others)	0.23c	0.24c	0.03
Locus of Control <sup>382</sup>	Internal (self control over events)	0.21a	-0.23a	-0.15a
	Powerful (Others control life)	-0.31d	0.32d	0.11
	Chance/Luck (events happen by chance)	-0.24c	0.22b	0.09
The Self Monitoring Scale <sup>383</sup>	Awareness of social surroundings and peoples reactions to oneself	0.12	-0.00	0.20a
Survey of Heterosexual interaction <sup>385</sup>	Nervousness when engaging in heterosexual interactions	-0.34d	0.30d	0.12
The Beck Depression Inventory <sup>384</sup>	Chronic tendency to feel depressed about oneself	-0.24c	0.32d	-0.00
The Sexual Opinion Survey <sup>386</sup>	Erotophilic, erotophobic and emotional response to sex	0.10	-0.05	0.32d
The Sex Anxiety Scale <sup>389</sup>	Sex anxiety	-0.35d	0.25b	-0.36d
The Sex Guilt Scale <sup>387</sup>	Tendency to feel guilty about sexual aspects of themselves	-0.20a	0.08	-0.22b
The Rosenberg Self Esteem Scale <sup>388</sup>	Feelings of global self worth	0.24c	-0.29d	-0.02
The Sexual Awareness Questionnaire	Sexual consciousness (sexual arousal and motivation)	0.45d	-0.41d	0.19a
	Sexual monitoring (external public concern with other's impression of own sexuality)	0.16a	-0.00	0.38d
	Sexiness consciousness (alertness to others perceptions of oneself)	0.32d	-0.23b	-0.01
	Sexual assertiveness (the dispositional tendency to act and behave in an independent, self-reliant fashion concerning own sexuality)	0.50d	-0.41d	0.34d

Key: a=  $p < .05$       b=  $p < .01$       c=  $p < .005$       d=  $p < .001$

Table 3.1 Correlation between the sexuality scale and several additional validity measures (females only) using canonical correlation analysis.

**Sexual esteem:** Sexual esteem was positively correlated with expressive personality attributes, self esteem, sexual assertiveness, sexual consciousness and sexiness

consciousness. There was a negative correlation with chance and powerful other on the locus of control. There was also a negative correlation with measures of heterosexual anxiety and clinical depression.

**Sexual depression:** There was a significant positive correlation between the sexual depression subscale and heterosexual anxiety, sex anxiety, chance, powerful other and clinical depression. Negative correlation was found between sexual depression and instrumental personality attributes, sexual assertiveness, self esteem, expressive personality attributes and sexiness consciousness.

**Sexual preoccupation:** Positive correlation was found between sexual preoccupation and erotophilia, sexual monitoring and sexual assertiveness. There was a negative correlation with sexual consciousness.

**Sensitivity and Specificity:** Correlation of the results of the Sexuality Scale with the numerous measures above provides evidence to support the sensitivity and specificity of the instrument. The validated questionnaires outlined in Table 3.2 measure depression, self esteem and preoccupation. The sexuality scale correlates with these measures when questions are phrased to explore sexual esteem, sexual depression and sexual preoccupation. Further correlation was found with the multi-dimensional sexuality questionnaire, which also aimed at specifically measuring aspects including sexual esteem, sexual depression and sexual preoccupation.

**Discriminant validity:** Sexual esteem concerns a tendency to have positive self regard and as such, be less likely to monitor oneself in public places. Sexually depressed individuals ought not to be concerned about monitoring their public presentation. People sexually preoccupied would not be expected to believe that their life events are controlled by powerful others. This assumption is supported by the findings presented in Table 3.1.

**Internal and external validity:** Students used in the development of the Sexuality Scale were psychology students from one geographical area. Analysis was conducted on mixed-sex samples, males only and females only. The results indicated that women were prepared to disclose their feelings and report symptoms in relation to the three

components being measured. Since its development, the scale has been used in numerous studies with a variety of subjects. These studies have provided further support for the reliability and validity of the instrument (see Section 3.11.6.4).

Ecological validity: Students within a university setting, in a mixed sex environment completed the Sexuality Scale. It appears that the psychology professor, or his representative, was present to over see the study. This false environment may have been uncomfortable or embarrassing for some people. Although students claimed that the answers they gave were accurate and honest, completing a questionnaire concerning intimate thoughts, feelings and activities in this artificial environment may have had a negative impact on ecological validity.

#### **3.11.6.4 Reliability studies**

Internal consistency using Cronbach's alpha statistic exceeded the minimum requirement for reliability in all domains of the questionnaire. The scale has been demonstrated to be highly reliable by both the first (.85-.93) and the subsequent studies (.90-.93).

Test-retest correlations for all three subscales demonstrated significant levels of stability for sexual esteem (range .69-.74), sexual depression (range .67-.76) and sexual preoccupation (range .70-.76) subscales ( $p < .001$ ).

A two group MANOVA was also conducted on the three subscales. The overall multivariate effect was statistically significant, Wilks' Lambda = .91,  $p < .002$ .

In summary, the three subscales had more than adequate internal consistency and test-retest reliability.<sup>392</sup>

#### **3.11.6.5 Feasibility**

The multidimensional Sexuality Questionnaire is by far the most comprehensive - covering aspects of sexual esteem, sexual preoccupation, sexual depression, internal sexual control, sexual consciousness, sexual motivation, sexual anxiety, sexual assertiveness, external sexual control, sexual monitoring, fear of sex and sexual

satisfaction. Whilst this additional information would have been very informative, it was felt that the length of the questionnaire, combined with the additional research tools, would have significantly reduced the response rate. In addition, many of the questions may not have been applicable to women who did not have a partner. Other research tools are often difficult to obtain, sexually explicit and focus on physiological and biological aspects of sexuality.

It was felt that the sexuality scale measured three valuable characteristics of the psychological aspects of sexuality without over burdening the patients with lengthy questionnaires to complete. It is free to use for research purposes and readily available.

Professor Snell was contacted to discuss the scoring of the scale. He reported that he had always scored completed questionnaires by hand due to difficulties in developing computerised programmes to score them. He had found this a very time consuming procedure. Following discussion with a computer programmer, a programme was developed to facilitate automatic scoring. Scores received via the programme were checked manually on a random sample of questionnaires. This research examined the overall trend in scores, comparison of scores between continent and incontinent women, and changes in the graduated scores.

#### **3.11.6.6 Other studies using the Sexuality Scale**

Further development has been undertaken combining the scale with personality assessments and measures of sexual related tendencies, attitudes and behaviours. This research provided additional evidence for the Sexuality Scales validity and cross validation of the three subscales.

The author of the Sexuality Scale continues to utilise it in research into various aspects of human sexuality including the masculine role, perceptions of rape victims, women's and men's disclosure patterns.<sup>293</sup>

In addition, other studies have successfully utilised the scale in a variety of settings. These include the exploration of forced sexual experience amongst heterosexual men,

<sup>393</sup>sexual narcissism and abusive men,<sup>394</sup> sexuality after burn injury,<sup>395</sup> male and female perception of relationships<sup>396</sup> treatment of orgasmic dysfunction<sup>397</sup> and sexuality of women with personality disorder.<sup>398</sup>

3.11.6.7 Alternatives to the Sexuality Scale

There are numerous scales aiming to measure various aspect of human sexuality. There are no alternatives to measuring sexual esteem, sexual preoccupation and sexual depression. Table 3.2 summarises the main research tools that could have been chosen to measure aspects of female sexuality. Many of the alternatives to the Sexuality Scale are lengthy or focus on biological aspects at the expense of psychological aspects.

Scale	What it measures	No. of questions	Author
The Sexuality Scale <sup>22</sup>	Sexual esteem Sexual depression Sexual preoccupation	30	Snell & Papini 1989
Sexual Attitude Scale (SAS) <sup>399</sup>	Conservative and liberal attitudes	25	Hudson & Murphy 1990
Human Sexuality Questionnaire <sup>400</sup>	Heterosexual and homosexual experience	14	Zuckerman 1973
Sexual Situation Questionnaire <sup>401</sup>	Sexual consent	12	Byers 1993
McCoy Female Sexuality Questionnaire <sup>402</sup>	Biological aspects of sexuality	19	McCoy 2000
Self Perception of Female Sexuality Survey Instrument <sup>403</sup>	Perception of orgasms	123	Davidson & Darling 1983
Sexual Awareness Scale <sup>404</sup>	Sexual consciousness Sexual monitoring Sexual assertiveness Sexiness-consciousness	36	Snell, Fisher & Miller 1991
The Multidimensional Sexuality Questionnaire <sup>405</sup>	12 aspects of sexual self concept	61	Snell, Fisher & Walters 1993
Revised Attitudes Towards Sexuality Inventory <sup>406</sup>	Aspects of sexuality and attitudes towards women	40	Patton and Mannison 1995
Women's Sexuality Questionnaire <sup>407;408;408</sup>	Frequency and subjective experience of female orgasm	Structured interview questions	Chambless and DeMarco 1984
Sexual Self Schema Scale - Women's Version <sup>409</sup>	Sexual Self Review. Thoughts about aspects of the self derived from past experience.	50	Cyranowski and Andersen 1994
Brief Index of Sexual Functioning for Women <sup>410</sup>	Desire, orgasm and satisfaction	22	Rosen, Taylor and Leiblum 1993

Table 3.2: Instruments to measure various aspects of sexuality

3.11.6.8 Conclusion

The Sexuality Scale is a valid, reliable questionnaire that measures sexual esteem, sexual preoccupation and sexual depression. It is acceptable to women and has been widely used in a variety of settings. As such, it is ideally suited for this research.

### 3.11.7 ACCESS TO HEALTH PROFESSIONALS TO REPORT SYMPTOMS

The semi-structured free text section accompanying the anal incontinence questionnaire asked patients if they had sought medical help for their condition and provided space for them to give an account of their experience. Those who had not sought help were asked to indicate any reasons why not. Respondents were also asked if they had discussed their problems with their partner.

Using a self-administered postal questionnaire to obtain qualitative data removes the ability to explore the issues highlighted, as may be the case in an interview. However, Bowling<sup>31</sup> conducted secondary analysis of three large population data sets derived from completion of SF-36<sup>362</sup> found that during interview, respondents produced inflated (good) health status scores in comparison to those obtained by postal survey. This suggests that interviews suffered greater social desirability bias.<sup>31</sup>

Coding is a method of classifying qualitative research data into themes. In this case, the study was exploratory and as such, coding formats were not deduced until after data completion.

### 3.11.8 MATERNAL, FETAL AND OBSTETRIC FACTORS

Some physical and social characteristics were obtained using a self-report questionnaire. For example, any previous history of urinary problems, medical conditions affecting bladder or bowel function, perception of severity of any bladder problems, breast or bottle feeding, maternal weight, smoking and relationship status. This accompanied each of the urinary and anal questionnaires.

Intrapartum and delivery data were obtained from maternity case notes and recorded on a proforma. In order to improve accuracy and detail of the information gathered, each hand written account of pregnancy and delivery information was examined in detail. If the information required was not clearly evident during this process, cross-reference was made with the departmental labour ward register and the neonatal case notes. In addition, the patient computerised record of care was accessed where necessary. Information collected included demographic and obstetric details, in addition to information regarding the care received and progress of labour.

### 3.12 RATIONALE FOR THE CHOSEN RESEARCH METHODOLOGY

The principal characteristic of a scholarly and scientific inquiry is the use of rationally grounded procedures to extend knowledge that a community of scholars regard as reliable and valid.<sup>411</sup> The method chosen to address a research problem will be influenced by the specific nature of the problem, research tradition and a need for justification of method.

Epistemology refers to the study of the nature of knowledge, or how we come to “know.” Epistemology is intimately related to ontology and methodology. Whilst ontology involves the philosophy of reality, epistemology addresses how we come to know that reality, while methodology identifies the particular practices used to attain knowledge of it. In the positivist paradigm, the object of study is independent of researchers; knowledge is discovered and verified through direct observation and measurement of phenomena; facts are established by taking apart a phenomenon to examine its component parts. Alternatively, in the constructionist paradigm, knowledge is established through the meaning attached to the phenomena studied; researchers interact with the subjects of study to obtain data; inquiry changes both researcher and subject; knowledge is context and time dependent.<sup>412;413</sup> There are many proposed differences between quantitative and qualitative epistemologies which ultimately present a philosophical rather than methodological debate. The philosophical assumptions, or paradigm, are crucial to understanding the overall perspective from which a study design is carried out and forms the underlying basis used to construct a scientific investigation.

#### 3.12.1 QUALITATIVE RESEARCH

In general, qualitative research is based on a relativistic, constructivist ontology that suggests that there is no single objective reality, but rather multiple realities constructed by human beings. People impose order on the world in an effort to construct meaning. Meaning lies in cognition not in elements external to us. Information is screened, translated, altered and possibly rejected by the knowledge that is already in the system. The resulting knowledge is idiosyncratic and is purposefully constructed.<sup>414</sup> Qualitative implies that the data are in a form of words,

rather than numbers, which are then reduced to themes and evaluated subjectively. The emphasis is on description and discovery rather than hypothesis testing. The qualitative researcher may argue that the experimental or quasi-experimental design of the quantitative approach could not do justice to describing phenomena such as relationships, experience or perceptions. Qualitative methods share three fundamental assumptions. Firstly, a holistic view. The assumption is that the whole is in some way different to the sum of its parts. Therefore, the aim is to understand phenomena in their entirety in order to develop an understanding of the person or situation. This is in contrast to experimental research which aims to isolate and manipulate specific variables. *The second assumption is an inductive approach. In contrast to the hypothetical-deductive approach of experimental research, the researcher does not make assumptions about the relationship between aspects of data or observations. The third and final assumption is naturalistic inquiry. The aim is to study phenomena in their natural environment. Conditions are not controlled and outcome variables are not limited. The appropriate method selection is contextual to the research problem, the nature of knowledge and the relationship between subject and researcher.*<sup>411</sup> Essentially, there are three research traditions within qualitative research.

#### **3.12.1.1 Phenomenology**

Phenomenological enquiry attempts to describe and elucidate the meaning of human experience, as freely as possible from theoretical or social constructs. Interviews are typically used as a source of data. The interest is not in “what causes  $x$  ?” but rather, “what is  $x$ ?”

#### **3.12.1.2 Hermeneutics**

Hermeneutics is basically the interpretation of text. The approach demands frequent return to the source of data to establish what it means to its creator and an attempt to interrogate that meaning by the researcher. The central assumption is that the analysis of a text will bring out the meaning of the text from the perspective of the author. A hermeneutic approach emphasises location and interpretation within a specific social and historical context.



### 3.12.1.3 Ethnographic Inquiry

The naturalistic-ethnographic paradigm includes anthropological description, field research, participant observation and naturalistic research. The aim is to capture and understand specific aspects of the life of a particular group by observing patterns of behaviour, customs and lifestyles. The focus is on obtaining full and detailed descriptions from participants. Typically, the researcher initiates prolonged contact and immersion in a setting of interest, while at the same time maintaining as much detachment as possible from the subject matter. Data are coded into themes and categories. The researcher considers how these categories relate to one another and the resulting pattern is sometimes called grounded theory.

### 3.12.2 QUANTITATIVE RESEARCH

In contrast, quantitative research is predominated by positivism where data and its analysis are considered value free and it is believed that phenomena do not change because they are being observed. The goal of knowledge is to describe the phenomena we experience. According to a positivist epistemology, science is seen as a route to the truth, understanding, prediction and thus control. The world is deterministic, influenced by laws of cause and effect. In positivism, science is largely a mechanical affair. Positivists believe in empiricism, the idea that observation and measurement are at the core of scientific knowledge. The key approach is experiment through direct manipulation and observation.<sup>415</sup> Methodological control is accomplished by two processes. One is random sampling, the subjects having been randomly drawn from a potential pool of subjects. The second is randomization which assigns the subjects to experimental conditions. The purpose is to isolate a variable of interest and manipulate it to observe the impact on a second variable or phenomenon. However, these efforts at experimental control are often impractical in social science or psychological research using human subjects. As a result, a quasi-experimental research approach is often used, that compromises some of the rigor of experimental control but maintains the logic of experimental research. The researcher does not employ random assignment of subject to condition, because events have already taken place or they are not able to be manipulated. Rather than cause and effect, the aim is for statements of correlation, the most common strategy to achieve this being the comparison between groups. Any conclusions regarding causality must be derived

from underlying theory rather than the results of the study itself. There are two important points to consider with quantitative research. The first is a tendency to over emphasize statistically significant results and under emphasize clinically or socially significant findings. Simply because the difference is significant at a certain probability level (typically .05) does not mean that it will be meaningful in practical terms.<sup>411</sup> Jacob Cohen, the founder of power analysis asserts that we can sometimes learn more from what we see than from what we compute and he advocates a move towards an increased use of graphical display of data rather than complicated statistical analysis.<sup>416</sup> The second point is the balance between control and meaningfulness. It is important to control the observation by eliminating confounding variables, but the observation of human behaviours still need to be realistic and meaningful.

### 3.12.3 MIXED METHOD RESEARCH

The methodology chosen depends on what one is trying to do, rather than a commitment to a particular paradigm. Different phenomena may require different methodologies. By focusing on the phenomenon under investigation, rather than on the methodology, the researcher can select an appropriate methodology for their enquiry.<sup>417</sup> A combination of quantitative and qualitative methods can combine the rigour of experimental design with a depth and understanding provided from qualitative methods.

There are several options for employing mixed method research. One option is to use both quantitative and qualitative methods to study the same phenomenon. However, the most common application of a mixed method approach is to assess a large number of participants using an experimental, positivist design and then conduct open-ended interviews with a subset of the original sample to derive a richer understanding of the phenomenon in question.<sup>411</sup> The main objections to a mixed method approach come from scholars with a strong epistemological commitment to either qualitative or quantitative research who see the underlying assumptions of each stance incompatible.

#### 3.12.4 QUANTITATIVE DATA

A primary consideration during the planning of this research was available resources. In particular, the available time of participants, time of the researcher, money and logistical considerations. In addition, consideration needed to be given to what was being measured, how it could be measured and how many times it needed to be measured.

In this research, it was not possible to manipulate variables as in an experimental design such as a randomised control trial. An ethnographic approach using interviews may have provided greater depth in exploring the complex interface between incontinence and sexuality. However, the scales used within the questionnaires were designed to measure the key variables required with validity and reliability and as such, qualitative interviews aimed at identifying key themes concerning incontinence and sexuality were not required. In addition, there is a high correlation between patient self report questionnaires and physician assessment of urinary incontinence symptoms.<sup>418</sup>

One of the aims of this research was to explore possible obstetric risk factors for incontinence. This would not be possible with a comparatively small sample size employed in qualitative research. Furthermore, as highlighted following the consultation process, discussing such sensitive subjects face to face with the researcher, with the possibility of a crying baby present, may lead to embarrassment for the woman and reluctance to engage in open discussion. Finally, securing private time on the four separate occasions to discuss these subjects at the various points in time could have been unrealistic.

Cohort studies are valuable to establish the prevalence and associated risk factors for a condition. As such, in order to address the stated aims and hypotheses, a cohort of patients was recruited to take part in this research. A survey design was chosen in order that information could be gathered on a larger sample size in order to identify covariance and possibly causality. Validated questionnaires were used to measure the key variables of incontinence and sexuality.

The impact of incontinence on sexuality is under-investigated. The direct result that incontinence has on sexual esteem, sexual preoccupation and sexual depression is not known. Power calculations aimed at providing an appropriate sample size were therefore not possible. In order to provide a wealth of data and provide statistically significant results, a considerable number of patients would need to be recruited into the cohort. Postal questionnaires are relatively cheap, quick and allow the participant to complete the probing questions within a private environment at a time suitable to themselves.

All research designs have limitations and compromise has to be reached between what is ideal and what is practicable.<sup>419</sup> Self-completed questionnaires are very efficient in terms of researcher and participant time and effort. They enable large numbers of patients to be offered recruitment into the study. However, there are several recognised disadvantages to this method. The data are, essentially, superficial,<sup>420</sup> providing little information on the patient experience and their perception of their condition, whilst still giving relevant information on the variables you wish to explore. In order to overcome these obstacles, it was decided to incorporate a qualitative element in to the research using additional questions, self report and free text rather than interviews. This is discussed more fully below.

### 3.12.5 QUALITATIVE DATA

The validated scales used thus far have attempted to measure the extent of incontinence and the corresponding impact upon quality of life. Patients' perceptions of their condition and sexuality have been self-reported. This personal perception of their own quality of life is largely responsible for predicting whether individuals seek care and treatment.<sup>31</sup> What has not been explored previously in this research is the individual experience when such care or treatment is accessed.

The final questionnaire, posted at one year, collected qualitative data via semi structured questions and free text. This allowed the patients to provide some in-depth descriptions of events and their personal perceptions of what they had experienced.<sup>421</sup> Questions were open and asked about access to and experience of, health care. Whilst

hypotheses had been formulated concerning access to health care, no such theories had been previously identified concerning the patients' perception or experience of their access to health care. As such, this part of the research was truly exploratory.<sup>422</sup> From this frame of reference, experiences, actions and events can be interpreted through the eyes of the participants, allowing sensitivity to the complexities of behaviour and meaning.<sup>421</sup>

#### **3.12.6 MULTIPLE METHODS**

Multiple method research is useful when the researcher wants to obtain objective information along with subjective information.<sup>423</sup> Using more than one method can have advantages. Rather than focusing on a single, specific research question, multiple methods can be used, as in this case, to address different but complimentary research questions. In a fundamentally quantitative study, statistical analysis may be enhanced by a qualitative narrative account.<sup>424</sup> When planning multiple method research, it is essential that careful consideration is given to the underlying assumptions of the paradigms used, in order that the methods adopted work in synergy rather than opposition.

### **3.13 ETHICAL CONSIDERATIONS AND REFERRAL PATHWAY**

Any research involving live subjects has the potential to pose ethical dilemmas. Probing for such sensitive information may be upsetting or disturbing for some participants. When addressing ethical considerations, the researcher should consider beneficence, dignity and justice.

The principal of beneficence is to avoid harm, minimise risk and maximise benefit. In this study, patients were assured that they could still obtain medical assistance for any problems they had concerning incontinence or sexuality. Agreeing to participate in the study did not alter their treatment. In addition, opting to drop out of the study did not alter their treatment either. Those patients who had not sought help themselves, were able to identify to the researcher at the one year point, that they would like a referral made on their behalf to an appropriate source of help.

In order to preserve dignity, participants received full details of what would be expected from them and what they could expect in return for taking part in the research. Participation was optional and voluntary. Questionnaires were coded to protect confidentiality.

Justice relates to fair treatment of subjects. This includes an equal opportunity to participate, protection of privacy, anonymity and confidentiality. In this study, patients with a predisposing disability that affected their incontinence status were excluded.

Vulnerable groups need further consideration. Deliberation was given to the inclusion of teenagers. Following the consultation process, it was decided to include teenagers in the research. Patients who had experienced a stillbirth or neonatal death were excluded as in order to maintain sensitivity to their situation; different questionnaires would need to be produced. Specifically, questions asking how long it was since their baby was born, breast-feeding and self-esteem were deemed to be insensitive and inappropriate.

Severe maternal illness requiring intensive care admission would present numerous compounding variables. This would include, but is not limited to catheterisation, drug treatment, and separation from baby and partner. As such, these patients were excluded from the study.

A referral pathway was established so that any patients contacting the researcher for help could be referred to a urogynaecologist, physiotherapist, continence advisor or counsellor as appropriate to their needs.

Ethical approval for this research was obtained initially in principle from Liverpool University. This component gave assurance of academic rigor in the proposed design. Ethical approval was then granted by Wirral and Cheshire Local research Ethics Committee (LREC). There were some difficulties in obtaining ethical approval initially, due to the nature of the subject. Concerns were raised in relation to the sexual component of the study, the inclusion of teenagers and the exclusion of ethnic

minorities. Two presentations were made to Wirral and Cheshire LREC following the initial application. Following this, approval was granted without amendment to the design and method.

3.14 IMPLEMENTATION

3.14.1 PILOT STUDY

Initially, 12 women were recruited. These formed a pilot group. Ten of these women remained in the study until their baby was a year old (83%). Two moved out of the area and were unable to be traced.

Prevalence rates of incontinence for the ten remaining women are displayed in Table 3.4. Fifty percent (n=5) were experiencing a degree of urinary incontinence (UI) 6 months after their baby was born. One was experiencing intercourse incontinence. When obstetric, maternal and fetal factors were considered, only one apparent difference could be found. Only one out of the five incontinent women had been catheterised during labour. In contrast, four out of the five continent women had been catheterised. This would suggest that catheterisation, and as such an empty bladder, afforded some degree of protection against the development of postnatal urinary incontinence. Although the numbers were very small, it was decided to amend the proforma used to collect obstetric data to establish how long before the onset of the second stage of labour the bladder had been emptied, either by catheterisation or spontaneous voiding.

Symptoms of urinary incontinence	Last trimester	80%
	6 weeks PN	60%
	6 months PN	50%
	one year PN	30%
Symptoms of anal incontinence	one year PN	20%

Table 3.3: Prevalence of incontinence symptoms in pilot group at each time interval

At one year, all five of the women who had been catheterised had no urinary or anal incontinence symptoms. In contrast, four of the five who had not been catheterised

had anal and/or urinary incontinence symptoms. This supports the initial assumption made at 6 months that an empty bladder affords a degree of protection against urinary incontinence. Two women in the pilot group were experiencing anal incontinence symptoms. Both were in the "not catheterised" group. The results from the pilot group are simplified and summarised in the Tables 3.4 to 3.7.

Patient ID	Urinary incontinence Last trimester	Urinary incontinence 6 weeks postnatal	Urinary incontinence 6 months postnatal	Urinary incontinence 1 year postnatal	Anal Incontinence	Duration of 1st stage (Hrs)	Duration of 2nd stage (Hrs)	Mode of delivery	Intrapartum catheterisation
1	none	none	none	none	no problem	3.00	0.00	elective CS	yes
2	moderate	slight	slight	none	no problem	6.55	2.44	vacuum	yes
3	slight	slight	moderate	none	mild, solid	13.45	1.44	normal	no
4	moderate	severe	severe	severe	mild, liquid	9.35	0.20	normal	no
5	severe	slight	slight	moderate	no problem	2.45	0.25	normal	no
6	severe	slight	none	none	no problem	16.00	1.17	normal	yes
7	none	none	none	none	no problem	4.45	1.30	vacuum	yes
8	slight	none	none	none	no problem	4.05	0.44	vacuum	yes
9	moderate	none	none	none	no problem	5.30	0.39	normal	no
10	severe	severe	moderate	severe	no problem	6.10	2.18	normal	no

Table 3.4: Degree of incontinence symptoms, duration of labour, mode of delivery and intrapartum catheterisation amongst pilot group.

There is increasing evidence that faecal incontinence is related to instrumental delivery.<sup>69</sup> In this small pilot study, 20% (n=2) of the women were experiencing involuntary loss of faecal material at one year postnatally. Both women had had a normal vaginal delivery with no obvious obstetric risk factor for the development of anal incontinence. Physiological studies suggest that nerve injury associated with childbirth directly contributes to anal incontinence<sup>140;166</sup> and may be present in up to a third of women.<sup>5;73</sup> Table 3.6 summarises the Manchester Health Questionnaire results for these two patients. The higher the score for each domain (max 100), the greater the impact on quality of life. Patient ID 4 reports that all domains have been affected, with emotion scoring highest.



ID	Symptoms	Symptom index (25 max)	General health	Impact	Role	Physical	Social	Relationship	Emotional	Energy
3	Urgency Anal incontinence Faecal Incontinence No urinary symptoms	8	50	25	37.5	0	0	0	16.6	12.5
4	Urgency Anal incontinence Faecal incontinence Severe urinary incontinence	11	50	50	37.5	37.5	33.3	50	75	62.5

Table 3.5: Impact of incontinence on quality of life as measured by the Manchester Health Questionnaire – pilot group results.

Table 3.7 summarises the scores from the sexuality questionnaires. At the one year stage, two women were experiencing urinary incontinence to a moderate or severe extent (patient ID 5 and 10). In both cases, measures of sexual esteem (SE), sexual depression (SD) and sexual preoccupation (SP) did not appear to be unduly affected. One patient (ID 3) experienced faecal incontinence without urinary symptoms. In this case, sexual depression appeared to increase at 6 weeks and 6 months, but returned to normal by one year. One patient (ID 4) reported severe urinary incontinence in addition to the involuntary loss of liquid faeces, faecal urgency and anal incontinence. Sexual esteem declined and sexual depression increased with a complete loss of interest in sex by the 6 month period. In addition to the impact on quality of life domains illustrated in Table 3.6, the combination of both urinary and faecal incontinence had a profound impact on sexuality for this patient. Whilst at the start of the study, this patient lived with her partner, she declared that her condition had had a detrimental effect on their relationship and by the one-year postnatal stage they were living separately. She had not discussed her condition with a health professional because she felt too embarrassed.

	Antenatal				6 weeks PN				6 months PN				One year PN				
Patient ID	UI	SE	SD	SP	UI	SE	SD	SP	UI	SE	SD	SP	UI	SE	SD	SP	Faecal Inc
1	no	9	-16	-1	no	4	-14	-7	no	6	-15	-1	no	9	-15	-1	no problem
2	mod	14	-16	15	slight	20	-3	17	slight	20	-11	17	no	20	-7	17	no problem
3	slight	14	-16	0	slight	14	-9	0	mod	18	-3	0	no	18	-16	0	mild, solid
4	mod	4	6	-2	severe	-1	8	-1	severe	-20	12	-20	severe	-19	14	-20	mild, liquid
5	severe	-1	4	0	slight	2	6	-5	slight	0	3	-17	mod	1	0	-11	no problem
6	severe	15	-12	-6	slight	9	3	3	no	10	-10	-8	no	12	-12	-8	no problem
7	no	0	-3	-2	no	-2	-6	-5	no	3	-10	-5	no	6	-12	-4	no problem
8	slight	5	-3	-11	no	-8	2	-7	no	-4	0	-10	no	-10	4	-13	no problem
9	mod	-8	-10	-19	no	-18	8	-18	no	-16	12	-18	no	-9	-7	-20	no problem
10	severe	4	0	-8	severe	6	-2	-6	severe	2	0	-4	severe	1	3	1	no problem

Table 3.6: Urinary Incontinence (UI), faecal incontinence, sexual esteem (SE), sexual depression (SD) and sexual preoccupation (SP) - pilot group results.

### 3.14.2 MAIN COHORT

Patients for the main cohort were identified following a normal 20-week scan from September 2002 until September 2003. Recruitment for the main cohort, via the posting of the initial questionnaire commenced November 2002 and continued until November 2003. Patients were expected to deliver between January 2003 and January 2004. The first patients received their one year questionnaire in February 2004. Data collection was complete, allowing time for late returns, Spring 2005.

### 3.14.3 MONITORING QUESTIONNAIRES DISTRIBUTION AND RESPONSE

On a weekly basis, patient information was sent directly to the researcher's computer, identifying eligible participants following their scan. At this point, address labels and a data sheet were prepared. The data sheet recorded the patient name and ID number and the date that each questionnaire was sent, the date of the reminders being posted and who had been telephoned. Each data sheet, and as such each weeks patients were given a letter to identify them. For example, A, B, C.....A1, B1, C1....A2, B2, C2. There were four occasions when errors occurred and the correct list of patients failed to be generated. This typically happened during Christmas, Easter and holiday times. As such, patient lists go up to D2 and identify 52 weeks of patients over a 56 week time frame. The various questionnaires and reminders were sent out on a weekly basis. Returns were posted directly to the researcher and a progress chart was used to monitor the response.

## **3.15 QUALITATIVE DATA**

Qualitative data and free text replies from the final questionnaires provided a descriptive account of individual experience. These accounts were examined individually and coded to identify themes.

## **3.16 STATISTICAL ANALYSIS**

The various statistical tests used to determine the significance of the findings were applied using the Statistics Package for Social Science (SPSS version 13.0 and version 14.0). As much of the data did not meet the assumptions for parametric tests

in that the requirements of normal distribution were not met, many analyses were conducted using non-parametric alternatives. Tests used were appropriate to the data characteristics. There were two fundamental purposes in analysing the data, that is comparing variables and their connections and comparing groups and their differences. These are discussed in greater detail below.

### 3.16.1 COMPARISON OF VARIABLES

The simplest way to look at whether two variables are associated is to look at whether they covary. This means that one when variable deviates from its mean; we expect the other variable to also deviate in the same or directly opposite way. Statistical tests used for these analyses were:

- Chi Square test is a test of independence to establish if two categorical variables are related (for example, any incontinence and induction of labour). This is an extremely elegant statistic based on the simple idea of comparing frequencies observed in certain categories to the frequencies you might expect to get in those categories by chance. Categories were established representing possible covariance and results for variables inserted in these categories. Chi Square was then used to determine whether these results differed sufficiently from those expected by chance to indicate that the covariance found was significant.
- Pearson correlation coefficient parametric tests are used to measure the strength of relationship between two continuous variables (e.g. birth weight and incontinence severity score). It can take any value from -1 (where as one variable changes, the other changes in the opposite direction by the same amount), to +1 (as one variable changes, the other changes in the same direction by the same amount).
- Spearman rank order test is a non-parametric alternative to the Pearson correlation coefficient test. Essentially, the Pearson correlation is performed on raw data that does not meet the assumptions required for a parametric test and that has, therefore been converted into ranked scores.
- Kendall's Tau is a non-parametric correlation coefficient similar to Spearman's correlation, but is preferred when the data sets are relatively small or there are a large number of tied ranks.

- Standard multiple regression is a technique used to explore the relationship between one continuous dependent variable and a number of independent predictors. The technique is based on correlations but allows more sophisticated exploration of the inter-relationship amongst the set of variables. Each independent variable is evaluated in terms of predictive power over and above that offered by all the other independent variables. Multiple regression makes a number of assumptions about the data and is not very forgiving if they are violated.

### 3.16.2 COMPARISON OF GROUPS

In addition to exploring which variables covary or predict an outcome, the experimental aim was to compare the effect of one variable on another. In order to do this, the continent group and incontinent group were compared to each other to determine whether their scores on particular variables were significantly different. Statistical tests used for these analyses were:

- ANOVA which is a parametric test where one independent (grouping) variable has three or more levels and there is also one continuous dependent variable. The statistical procedure uses the *F*-ratio. The *F*-ratio is the ratio of the average variability in the data that a given model can explain to the average variability unexplained by that same model. In experimental research, the model tends to be defined in terms of group means and the resulting ANOVA is therefore an overall test of whether group means differ.
- The independent-samples t-test compares the mean score for two different groups of people or conditions. The mean difference between pairs of scores is divided by the standard deviation of the differences between groups.
- The Friedman is a non-parametric alternative to a repeated measures ANOVA. The same subjects are measured at three or more points in time. The calculation is based on ranked data.
- The Kruskal Wallis test is a non-parametric alternative to a between groups ANOVA. It compares the scores on continuous variables for three or more groups. It is similar to a Mann-Whitney test, but designed for occasions when there are more than two groups.

- Chi Square is designed for use with categorical data. The test compares the data in each group with that which might be expected by chance.
- The Mann-Whitney test is a non-parametric alternative to the independent samples t test. The t test compares means where as Mann-Whitney compares the medians of two groups. This test is used when there is one categorical variable with two groups (such as any urinary incontinence) and one continuous variable (such as QoL score).

These statistical tests formed the basis for the analysis of data. Each test is referred to when the data and the inferential analysis is presented in Chapter 4.

### 3.16.3 NUMBER NEEDED TO TREAT

The absolute risk reduction (ARR) is the difference between the event rate in the experimental group and the event rate in the control group. It is the denominator in the number needed to treat (NNT) calculation.

The NNT is the number of patients who need to be treated to prevent 1 adverse outcome. Reported as a whole number, it is calculated as  $1/ARR$ , rounded to the next highest whole number, and accompanied by its 95% confidence interval (CI).

## **3.17 DATA MANAGEMENT**

Prior to the commencement of the research a computer programme was developed to generate automatic scores from the responses on the urinary incontinence and sexuality questionnaires. This was used to check the scores from the pilot group, which had been hand scored. This confirmed accuracy of the programme. All anal incontinence questionnaires were scored by hand.

A Data Entry Assistant (DEA) was employed. This ensured that all data could be entered from the questionnaires onto an electronic data base without the principal researcher having knowledge of the results. The DEA also contacted non-responders by telephone.

This initial data base was then analysed using the computer programme, written and operated by an independent I.T. officer. The I.T. officer generated a second database of scores for the QoL domains, severity scores and sexuality components etc. The principal researcher hand searched all case notes personally. This ensured consistency and reduced interpretation bias. Extracted data was collated onto a proforma and entered into the database by the DEA. On receipt of this second database from the I.T. officer, the DEA added the remaining obstetric data extracted from the case notes. This formed the main database. Only at this point did the principal researcher have access to complete data sets for each respondent. Access was restricted to the DEA and principal researcher via password protection.

Data characteristics were checked using SPSS and any outliers were identified and confirmed. Statistical support was obtained from Chester University.

### **3.19 SUMMARY**

#### **3.19.1 PROBLEM**

What are the obstetric, maternal and fetal factors that increase the risk of postnatal incontinence and how does this condition affect female sexuality?

#### **3.19.2 METHOD**

Survey research using five data sources. In addition to obstetric information, self-completed, validated, postal questionnaires plus semi-structured open questions and free text were collated. This was a longitudinal prospective study collecting data at four time intervals, each patient being in the study for a year and a half.

**CHAPTER 4 RESULTS**

**4.1 INTRODUCTION**

This chapter addresses the implementation of the study and reports on findings from recruitment at 30 weeks gestation, up to one year postnatal. Data were obtained from questionnaires, which were completed by participating women at four specific time points. Further data was extracted from obstetric case-notes.

Data is presented sequentially and ordered around the identified research questions, in the form of frequency Tables and line or bar charts. Details include recruitment and response rates; maternal and fetal data on the women participating in the study; the prevalence, risk factors and quality of life impact of both urinary and anal incontinence identified in this study; the impact that incontinence has on the sexual esteem, sexual depression and sexual preoccupation and finally, findings relating to discussion and disclosure will be presented, covering interaction with health professionals and partners. Women in the study delivered their baby between January 2003 and January 2004. Background obstetric data for the calendar year of 2003 and normative sexuality data will also be presented. The chapter will conclude with an overall summary of the study findings.

**4.2 RECRUITMENT AND RESPONSE RATES**

Women were identified during the year September 2002-2003 when they presented for their 20-week obstetric scan. During this time, 1117 primiparous women had a 20-week scan. Initial exclusions from the study totalled 86. The reasons for exclusion are summarised in Table 4.1

Moved locality before delivery	Inability to understand questionnaire	Fetal loss	Severe maternal illness	Multiple pregnancy	Pre-existing disability	Severe fetal abnormality	<14yrs of age, excluded at parents request	Homeless	Total
29	30	19	2	2	1	1	1	1	86

Table 4.1: Exclusions from recruitment into study

The remaining 1,031 women were invited to take part in the study. However, prior to delivery a further eight women were withdrawn due to severe maternal illness. This brought the total exclusions to 94 with 1,023 women offered full participation. A total of 862 women (84.1%) agreed to participate in the study. Of the 862 women who enrolled in the study, 466 (54%) completed the antenatal questionnaire. Some women were then lost to follow up, failing to return any postnatal questionnaires after several attempts to contact them (n=109, 12.6%). This antenatal data is included in analysis.

A total of 516 of the 862 women recruited (59.9%) returned at least two of the three postnatal questionnaires and are included in postnatal data analysis. Women only returning one postnatal questionnaire (n=237, 27.5%) were excluded from data analysis due to incompleteness. Of the 516 postnatal data sets analysed, 404 (78.3%) women completed the yellow questionnaire at 6 weeks postnatal; 397 (76.9%) completed the pink, 6 month postnatal questionnaire and 336 (65.1%) completed the green, one year postnatal questionnaires.

4.3 OBSTETRIC, AND DEMOGRAPHIC DATA FROM RESPONDENTS

Baseline obstetric data for the calendar year Jan-Dec 2003 inclusive is presented in Table 4.2. For comparison, the data from those who participated in this research is also included. From the similarity of distribution of delivery mode, it was concluded that the study sample was representative of the whole available population.

Mode of delivery	% all deliveries (primiparous)	% this study
Spontaneous vaginal delivery rate	52.8	50.9
Emergency caesarean section rate	17.1	16.4
Ventouse delivery	13.9	12.7
Non-rotational forceps delivery	8.8	6.7
Elective caesarean section rate	5.5	6.9
Rotational forceps delivery	1.6	1.9
Failed instrumental leading to caesarean section delivery	0.7	2.7
Failed Ventouse leading to forceps delivery	0.5	1.7

Table 4.2: Baseline obstetric data for women who participated in the study



Body Mass Index at the time of booking was available for 402 participants. BMI ranged from a minimum of 17 to a maximum of 42, the mean being 25.38 and the standard deviation being 4.59. Figure 4.1 illustrates BMI distribution. There is positive skewness (1.021) and Kurtosis (0.894) indicative of results clustered towards the lower range of values with a central peak. Kolmogorov-Smirnov statistic <.005 indicating a violation of the assumption of normality. In order to compute Analysis of Variance, BMI was banded into five approximately equal percentiles (Table 4.3).

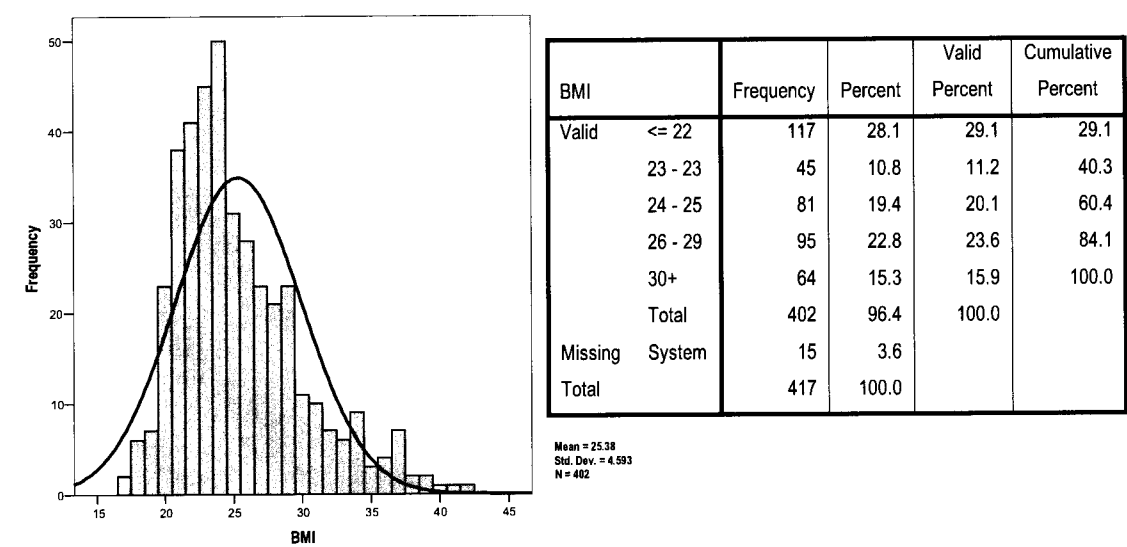


Table 4.3: BMI groupings

Figure 4.1: BMI of participants

Age at booking ranged from a minimum of 15 years to a maximum of 40 years with a mean age of 27.31 years and standard deviation of 5.89. Figure 4.2 illustrates age distribution. Skewness (-0.372) and Kurtosis (-0.768) are both negative indicative of clustering of values at the higher end of the range with less of a central peak. Kolmogorov-Smirnov statistic <.005 indicating a violation of the assumption of normality. In order to compute Analysis of Variance, age of respondents was banded into five approximately equal percentiles (Table 4.4).

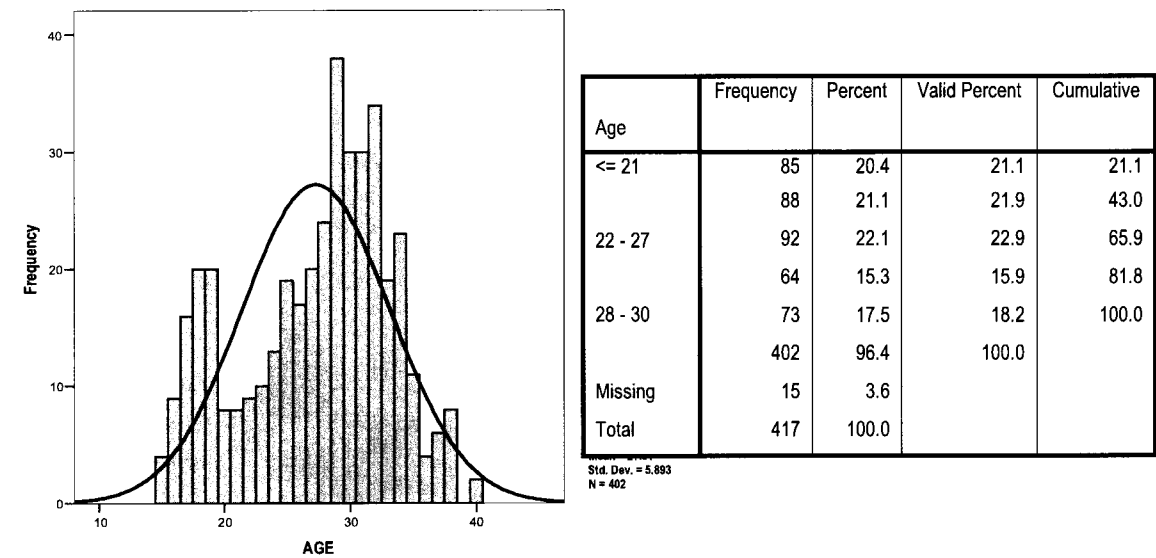


Table 4.4: Age groups in five equal percentiles

Figure 4.2: Age of participants

Gestation at delivery ranged from 24 to 42 weeks. The mean gestational age at delivery was 39.45 weeks. Birth weight at delivery was available in 390 cases and ranged from 806g to 5,310g, the mean being 3,383g and the standard deviation 538g. Skewness (-0.581) suggests that results are clustered in the higher value range. Kurtosis (2.434) confirms a large central peak with longer thin tails and a Kolmogorov-Smirnov statistic of <.005 indicating a violation of the assumption of normality. This is quite common with large samples and the histogram illustrates that scores appear reasonably normally distributed. Figure 4.3 illustrates birth weight distribution.

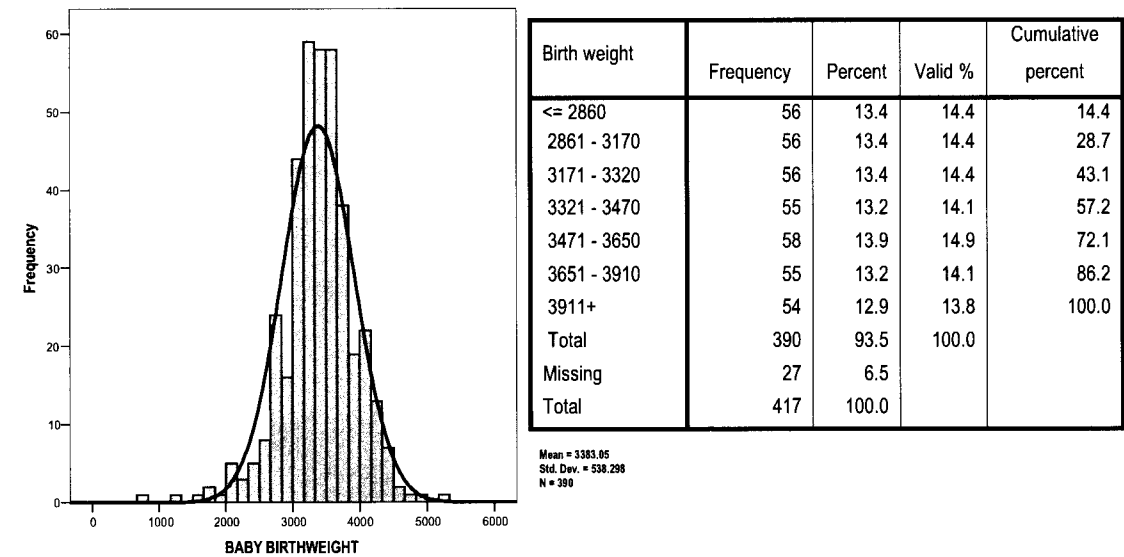


Table 4.5: Birth weight groups

Figure 4.3: Birth weight of babies

In order to compute Analysis of Variance, birth weight was categorised into seven approximately equal percentiles (Table 4.5). Of the women who participated in the study, 30.3% had their labour induced. This is slightly higher than the rate for all first time mothers during the study time period (27%).

4.3.1 SUMMARY OF CHARACTERISTICS OF STUDY POPULATION

A summary of the characteristics of the study population (age, BMI, baby birth weight and mode of delivery) is provided below in Table 4.6. The characteristics of those who responded at each time frame did not change significantly.

		Number
Age (Banded)	<= 21	85
	22 - 27	88
	28 - 30	92
	31 - 32	64
	33+	73
BMI (Banded)	<= 22	117
	23 - 23	45
	24 - 25	81
	26 - 29	95
	30+	64
Baby birth weight (Banded)	<= 2860	56
	2861 - 3170	56
	3171 - 3320	56
	3321 - 3470	55
	3471 - 3650	58
	3651 - 3910	55
	3911+	54
Delivery mode	Elective CS	27
	Emergency CS	76
	forceps	41
	Ventouse	51
	normal	203

Table 4.6: Summary of study population

4.4 ANTENATAL URINARY SYMPTOMS

Antenatal data analysis is based on replies from 466 women. Table 4.7 summarises the symptoms they described. No urinary symptoms at all were reported by 17.4% (n=81). The remaining 82.6% (n=385) had a variety of symptoms to varying degrees of severity. Nocturia and frequency were the most common reported symptoms – as

expected in the antenatal period. They were also the most severe symptoms, with many of the women affected by this “a lot.”

Urinary symptom	% of total respondents (n=466)				
	None	Any	A little	Moderate	A lot
Frequency	27.7	72.3	22.7	27.9	21.7
Urgency	62.7	37.3	18.9	16.3	2.1
Nocturia	24.2	76.2	30.7	26.2	18.9
Urge incontinence	76.6	23.5	15.5	6.7	1.3
Stress incontinence	60.3	39.7	23.4	10.7	5.6
Nocturnal enuresis	94.4	5.6	5.2	0.2	0.2
Intercourse incontinence	93.1	6.8	6.2	0.6	0.0
Frequent urine infection	85.4	14.6	8.8	3.4	2.4
Bladder pain	83.9	16.1	12.2	2.8	1.1

Table 4.7: Prevalence of antenatal urinary symptoms at 30 weeks gestation

4.5 PREVALENCE OF URINARY SYMPTOMS AT SIX WEEKS POSTNATAL

At 6 weeks postnatal, 404 women returned complete questionnaires. No urinary symptoms were reported by 45% (n=182) of the women who replied. The remaining 55% had a variety of symptoms, summarised in Table 4.8. Nocturia and frequency remain the most common, however, far less than the rates reported antenatally.

Urinary symptom	% of total respondents (n=404)				
	None	Any	A little	Moderate	A lot
Frequency	65.3	34.6	18.8	13.6	2.2
Urgency	77.2	22.8	14.9	6.2	1.7
Nocturia	64.4	35.6	25.2	9.2	1.2
Urge incontinence	78.7	21.2	12.6	5.9	2.7
Stress incontinence	71.8	28.2	18.3	6.7	3.2
Nocturnal enuresis	95.0	4.9	4.0	0.2	0.7
Intercourse incontinence	93.6	6.4	4.7	1.5	0.2
Frequent urine infection	89.9	10.1	6.2	2.7	1.2
Bladder pain	90.3	9.7	7.2	2.0	0.5

Table 4.8: Prevalence of urinary symptoms at 6 weeks postnatal

4.6 PREVALENCE OF URINARY SYMPTOMS AT SIX MONTHS POSTNATAL

At 6 months postnatal, 397 women returned a complete questionnaire. No urinary symptoms were reported by 44% (n=176) of the women who replied. The remaining

56% had a variety of symptoms, summarised in Table 4.9. Nocturia and frequency remain the most common. There is also a high level of stress incontinence.

Urinary symptom	% of total respondents (n=397)				
	None	Any	A little	Moderate	A lot
Frequency	63.5	36.6	18.9	13.9	3.8
Urgency	76.1	23.6	14.6	8.8	0.5
Nocturia	65.0	35.1	22.7	10.6	1.8
Urge incontinence	78.6	21.4	14.1	6.3	1.0
Stress incontinence	69.0	31.0	21.4	6.3	3.3
Nocturnal enuresis	95.2	4.8	4.0	0.3	0.5
Intercourse incontinence	93.7	6.4	4.8	1.3	0.3
Frequent urine infection	90.4	9.6	5.8	2.8	1.0
Bladder pain	88.7	11.2	8.2	2.0	1.0

Table 4.9: Prevalence of urinary symptoms at 6 months postnatal

In total, 15.3% (n=61) of women completing this 6 month questionnaire reported new onset of urinary incontinence. New onset urge incontinence was reported by 4.0% (n=16), new onset stress incontinence by 7.5% (n=30) and new onset of both urge and stress incontinence by 3.8% (n=15). Women were also asked if they perceived their bladder problem to be getting better, getting worse or staying the same. The majority of women (84%) reporting new onset stress incontinence, or new stress and urge incontinence at 6 months postnatal perceived their condition to be the same or better than before. However, of those reporting new onset urge incontinence 45% perceived their condition to be getting worse.

4.7 PREVALENCE OF URINARY SYMPTOMS AT ONE YEAR POSTNATAL

At one year postnatal, 336 women returned a complete questionnaire. No urinary symptoms were reported by 62% (n=208) of the women who replied. The remaining 38% had a variety of symptoms, summarised in Table 4.10. Stress incontinence is the most common reported symptom. In total, 11% (n=37) of women completing this one year questionnaire reported new onset of urinary incontinence. New onset urge incontinence was reported by 3.9% (n=13), new onset stress incontinence by 4.5% (n=15) and new onset of both urge and stress incontinence by 2.7% (n=9). As found at the 6 month postnatal questionnaire, many women reporting new symptoms perceived their condition to be the same or better than before.

Urinary symptom	% of total respondents (n=336)				
	None	Any	A little	Moderate	A lot
Frequency	76.2	23.8	10.7	7.4	5.7
Urgency	79.8	20.2	11.3	8.3	0.6
Nocturia	78.3	21.7	11.3	7.7	2.7
Urge incontinence	83.6	16.4	9.5	5.1	1.8
Stress incontinence	73.5	26.5	15.5	8.0	3.0
Nocturnal enuresis	98.2	1.8	1.2	0.3	0.3
Intercourse incontinence	96.1	3.9	2.1	1.5	0.3
Frequent urine infection	93.5	6.6	3.6	1.8	1.2
Bladder pain	92.6	7.5	3.9	2.1	1.5

Table 4.10: Prevalence of urinary symptoms at one year postnatal

4.8 TRENDS OF REPORTED URINARY SYMPTOMS

Figure 4.4 illustrates the trends in urinary symptoms reported for each of the time intervals in the study. Limited data are available for nulliparous controls. However, rates of stress and urge incontinence are available and are significantly lower than those rates reported antenatally or at any time postnatally (stress incontinence  $X^2=81$ .  $p<.005$ ; urge incontinence  $X^2=92.16$ .  $p<.005$ ). It is clearly evident that the reported rates of all urinary symptoms are considerably higher during pregnancy. Rates of urinary urgency remain fairly constant in the region of 20% throughout the postnatal period. Urinary frequency is particularly high antenatally and remains at a high level (35-37%) in the postnatal period, before resolving to some extent by one year after delivery, however, there remains a persistent 24% of women with this symptom even at one year.

Nocturnal enuresis, frequent infection and intercourse incontinence are all slightly higher antenatally, resolving to lower levels at one year postnatal. Some symptoms, for example, urgency, frequency and stress incontinence appear to have an increase in reported prevalence at the 6 month postnatal stage, although this is not statistically significant. The number of subjects reporting any UI symptoms was analysed using Chi Square and found to be significantly higher antenatally ( $X^2=67.280$ .  $p<.005$ ) and lower at one year ( $X^2=40.5$ ,  $p<.005$ ).

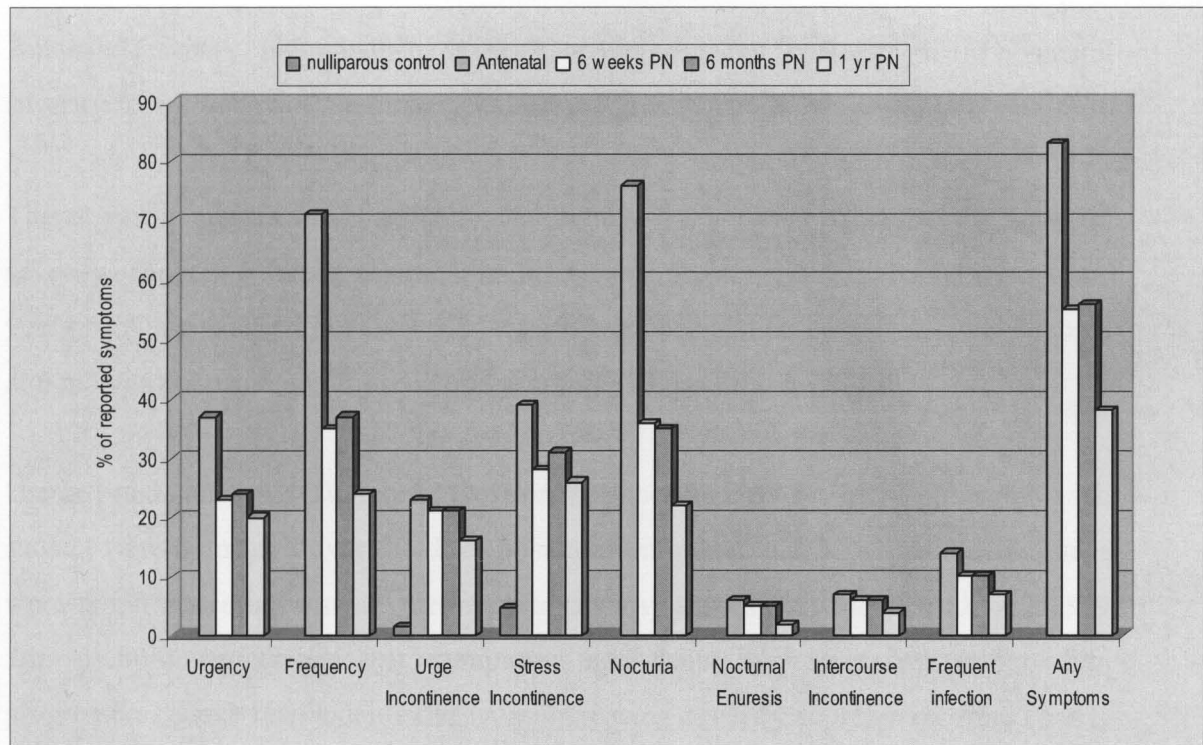


Figure 4.4: Trends in reported urinary symptoms

Figure 4.5 summarises all symptoms reported at each time interval. The higher prevalence of frequency and nocturia antenatally is clearly apparent.

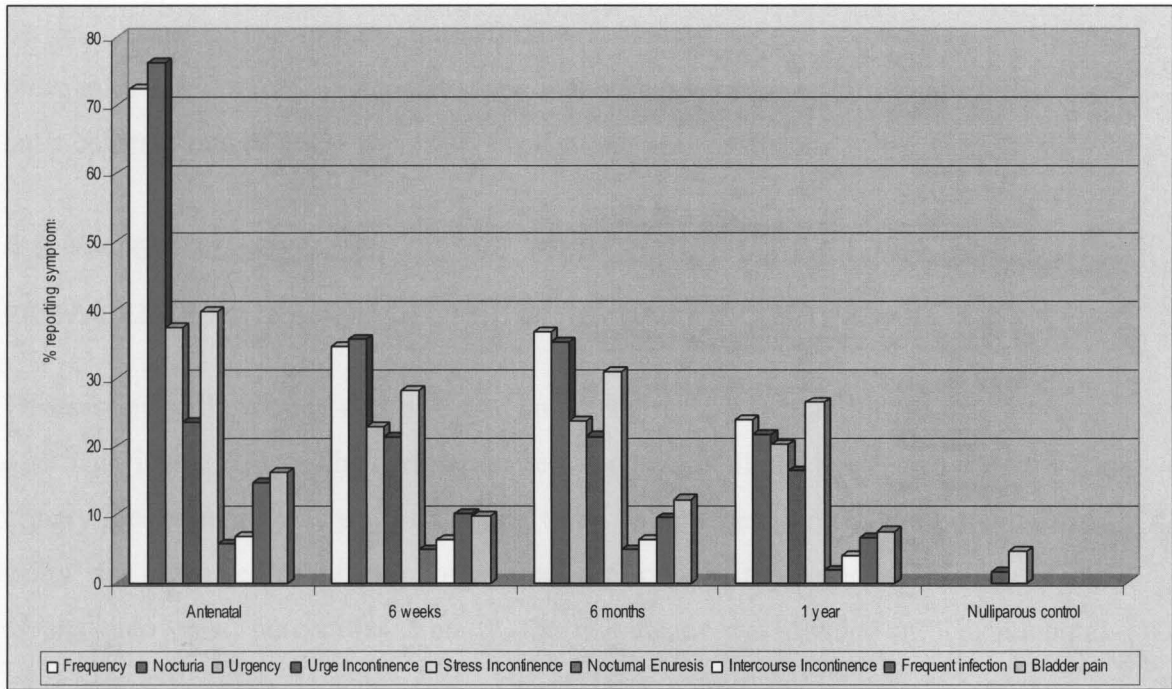


Figure 4.5: All urinary symptoms reported at each time interval.

### 4.8.1 SEVERITY MEASURES

Antenatal urinary incontinence severity scores did not correlate with postnatal severity scores at any of the three time intervals investigated.

There was a significant correlation (Spearman Rank Order Correlation) between severity scores at 6 weeks postnatal and those at 6 months ( $r=.725$ ,  $p<.005$ ), and one year ( $r=.579$ ,  $p<.005$ ). There was also a significant correlation between severity scores at 6 months postnatal and those at one year ( $r=.713$ ,  $p<.005$ ).

Using Friedman's ANOVA test, the urinary incontinence severity scores for each subject were compared over the three postnatal time intervals. Significant differences were found indicating a steady decrease in severity scores over the year ( $\chi^2 = 21.369$  2df,  $p<.005$ ) suggesting that symptoms are generally regressive, rather than progressive. Some respondents did have increasing severity scores over time ( $n=41$ , 13.3%) suggesting that their condition was in fact getting worse. Risk factors associated with this finding are discussed below.

### 4.8.2 URINARY INCONTINENCE

Urge incontinence rates are just above 20% throughout the antenatal and postnatal period, being fairly constant until finally subsiding at one year to a persistent prevalence rate of 16%. Antenatal stress incontinence resolves a little after delivery, but a constant rate of 26-31% persists even at one year postnatal.

## **4.9 MATERNAL, FETAL OR SOCIAL VARIABLES THAT WILL INFLUENCE THE PREVALENCE RATES AND DEGREE OF URINARY INCONTINENCE**

This section will examine non-obstetric and obstetric risk factors for the development of urinary incontinence. The correlation between age, BMI and baby birth weight with urinary incontinence was explored using three approaches. Firstly, the potential risk factor was examined as a continuous variable. Secondly, the potential risk factor was divided into equal percentiles. Finally, the risk factor was divided into incremental



categories. This approach was used to enable results to be compared to other published research and also to enable further statistical analysis to be undertaken.

#### 4.9.1 AGE

##### **4.9.1.1 Severity scores**

The relationship between UI severity scores and age as a continuous variable was investigated using Spearman Rank Order Correlation. There was a small, negative correlation between the two variables antenatally ( $r = -.212$ ,  $n = 402$ ,  $p < .03$ ), at 6 weeks postnatal ( $r = -.202$ ,  $n = 386$ ,  $p < .0005$ ), at 6 months ( $r = -.17$ ,  $n = 379$ ,  $p = .001$ ) and at one year postnatal ( $r = -.17$ ,  $n = 322$ ,  $p = .003$ ) indicating that the younger subjects were experiencing greater incontinence severity scores.

Further analysis was conducted using Kruskal-Wallis test and the five percentile age groups identified above. Severity scores were not significantly affected by the age of the respondent antenatally. However, they were postnatally at 6 weeks ( $H[4] = 17.206$ ;  $p = .002$ , 99% CI .001-.003). This difference remained significant at one year ( $H[4] = 9.512$ ;  $p = .044$ , 99% CI .039-.049). Mann-Whitney tests were used to follow up this finding. A Bonferroni correction was applied and so all effects are reported at a .0125 level of significance. It appeared that severity scores in the age band under 21 years were significantly higher than any other age band ( $U = 2018$ ,  $r = -.36$ ). Jonckheere's test revealed a significant trend in the data: lower age groups had higher median severity scores ( $J = 26107$ ,  $Z = -3.216$ ,  $r = -.36$ ). Figure 4.6 illustrates mean severity scores for each age band and clearly demonstrates a trend of decreasing scores with increasing age during the postnatal period.

Finally, age was divided into incremental categories and analysis repeated using Kruskal-Wallis (Figure 4.7). Confirming the results above, severity scores were not affected by age during the antenatal period ( $p = .3$ ) but the postnatal severity was affected. Results at 6 weeks ( $H[4] = 17.159$ ;  $p = .002$ , 99% CI .001-.003) remained significant at one year ( $H[4] = 12.374$ ;  $p = .015$ , 99% CI .011-.017). Again, Jonckheere's test revealed a significant, although less pronounced trend in data with

the <20 years of age group having higher postnatal severity scores ( $J=25030$ ,  $Z=-2.67$ ,  $r= -.15$ ).

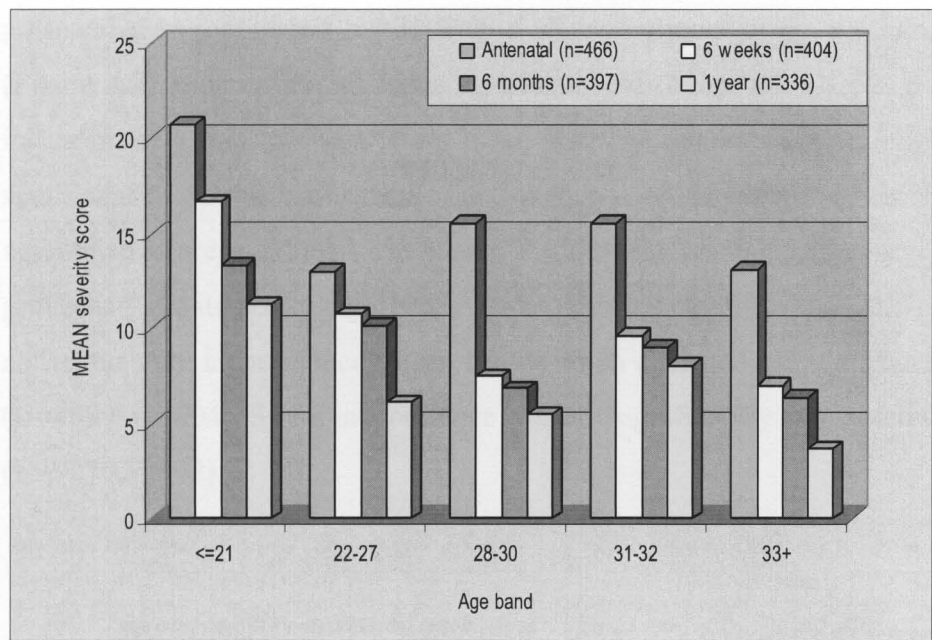


Figure 4.6: Mean severity scores banded by percentile age at each time interval

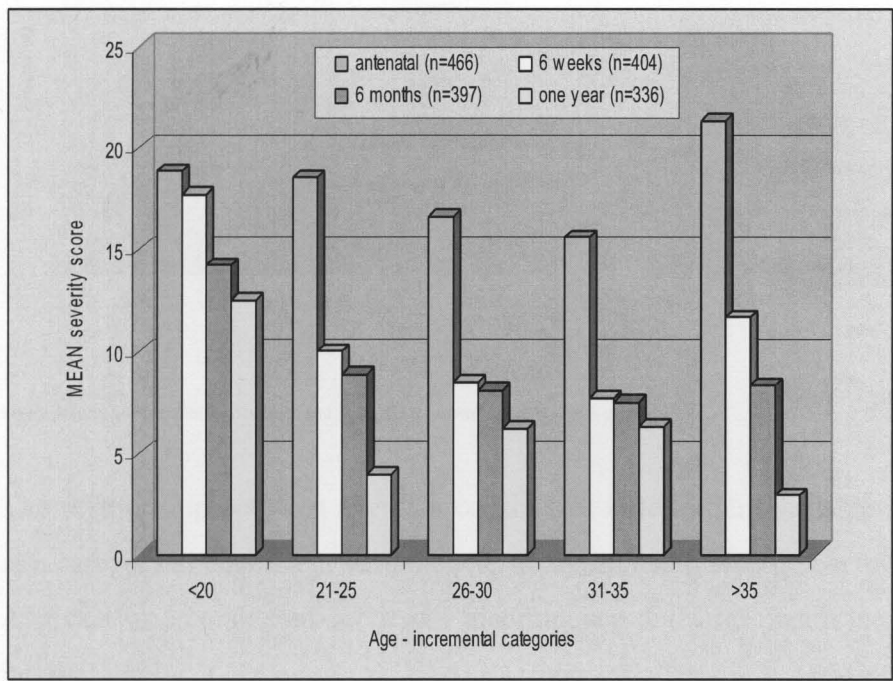


Figure 4.7: Mean severity score banded by incremental age at each time interval

4.9.1.1 Urinary incontinence

The mean age of those respondents reporting any urinary incontinence at 6 weeks postnatal was compared to those who were continent using a Mann Whitney test (Figure 4.8) and was found to be significantly different ( $U=14252$ ,  $p=.05$ ) with the incontinence group having a lower mean age. The results were no longer statistically significant at one year postnatal ( $U=10009$ ,  $p=.76$ ). However, when stress and urge incontinence are examined separately at one year postnatal, the urge incontinence group had a statistically significant lower age (mean 24.92) than the group who did not report urge incontinence (mean 28.14) when analysed using a Mann Whitney test ( $U=4699$ ,  $p=.004$ ). Stress incontinence was not significantly associated with mean age ( $U=9270$ ,  $p=.62$ ).

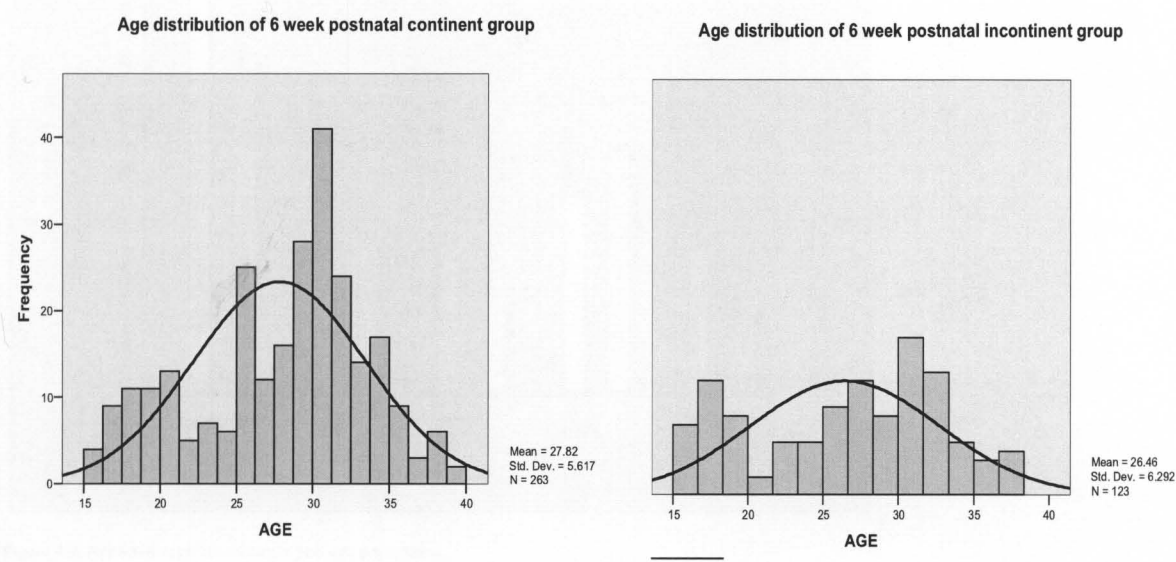


Figure 4.8: Age distribution of continent and incontinent respondents at 6 weeks postnatal

The relationship between age as a continuous independent variable and incontinence as a categorical dependent variable was analysed using biserial correlation coefficient. Analysis was conducted for stress incontinence and urge incontinence at each time interval.

Age did not significantly correlate with reported stress incontinence ( $r=.09$ ,  $p=.8$ ). However there was a small, negative, significant relationship between age and

reported urge incontinence at 6 weeks postnatal ( $r=-.192$ ,  $p<.005$ ,  $n=386$ ), at 6 months ( $r=-.154$ ,  $p=.003$ ,  $n=366$ ) and at one year ( $r=-.151$ ,  $p=.007$ ,  $n=313$ ).

Further analysis was conducted using Kruskal-Wallis test and the five percentile age groups identified above. Reported rates of urge incontinence were significantly associated with age bands antenatally ( $H[4]=9.833$ ;  $p=.041$ , 99% CI .036-.046) at 6 weeks ( $H[4]=19.736$ ;  $p<.005$ , 99% CI .000-.001), at 6 months ( $H[4]=15.316$ ;  $p=.003$ , 99% CI .002-.005). This difference remained significant at one year ( $H[4]=16.923$ ;  $p=.002$ , 99% CI .001-.003). Figure 4.9 clearly shows higher reported urge incontinence in lower age groups. Stress incontinence was not significantly associated with age percentiles.

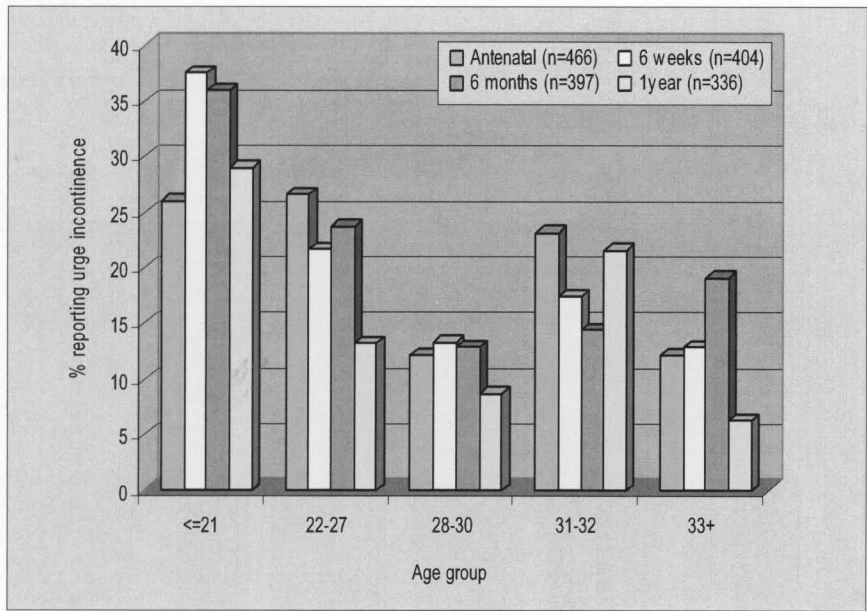


Figure 4.9: Reported urge incontinence and age percentiles

Finally, Kruskal-Wallis analysis was used to re-examine incremental age categories and incontinence (Figure 4.10). Statistical significance was not demonstrated for the antenatal results. However, reported rate of urge incontinence was significantly associated with the under 20 year age band at 6 weeks ( $H[4]=20.686$ ;  $p<.001$ , 99% CI .000-.001), 6 months ( $H[4] = 13.317$ ;  $p=.01$ , 99% CI .005-.01) and at a year postnatal ( $H[4]=18.454$ ;  $p=.001$ , 99% CI .000-.001). Long-term (one year) rates of urge incontinence were significantly lower (when analysed using Mann Whitney test) in the  $>35$  year age group than in the  $<20$  year group ( $U=380$ ,  $r= -.33$ ,  $p=.004$ ). Again, stress incontinence was not statistically significant (Figure 4.11).

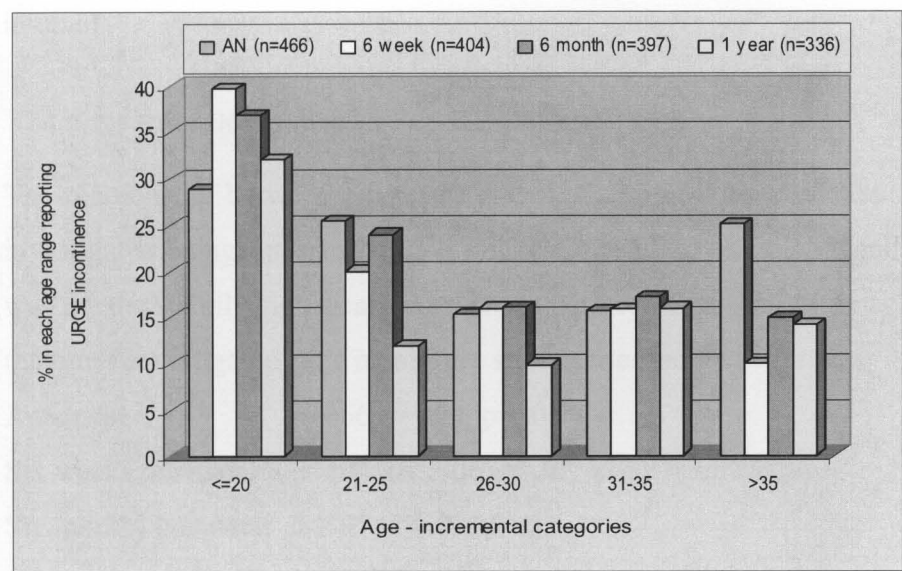


Figure 4.10: Incremental age bands and urge incontinence

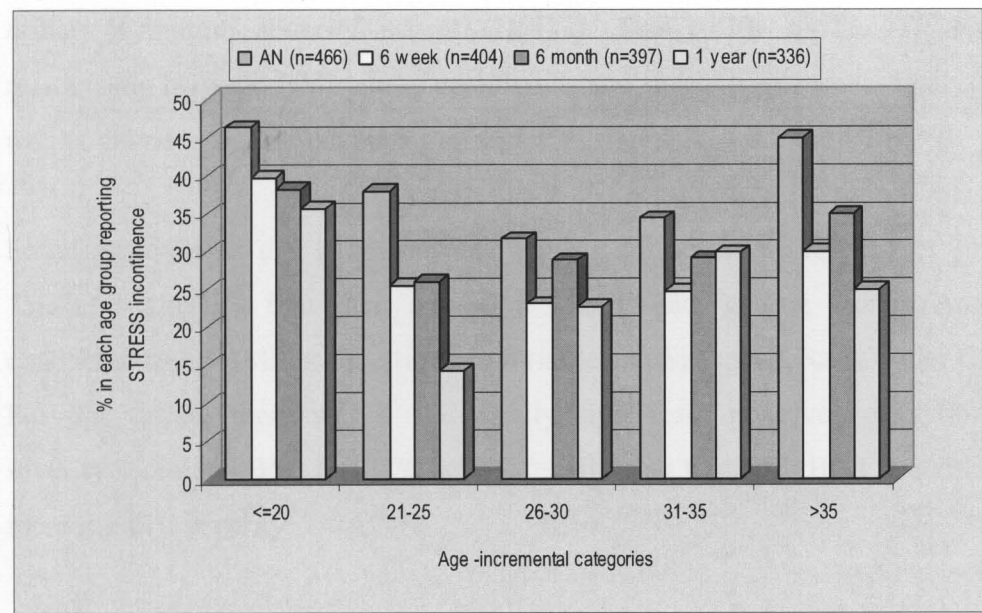


Figure 4.11: Incremental age bands and stress incontinence

4.9.2 BODY MASS INDEX

BMI was first recorded at the booking interview, when most respondents were in the first trimester of pregnancy. This initial BMI was used to analyse antenatal results, as the contribution to maternal weight of the fetoplacental unit could not be standardised. Throughout the postnatal phase of the study, respondents were asked to

indicate their weight. From this, BMI could be recalculated for each postnatal time interval.

**4.9.2.1 Severity scores**

The relationship between UI severity scores and BMI as a continuous variable was investigated using Spearman Rank Order Correlation and also Kendall’s Tau. There was no statistically significant correlation between BMI and severity scores at any of the times investigated. The results are summarised below:

Antenatal	n=466, r= .09, p= .06
Six weeks postnatal	n=404, r=-.006, p=.9
Six months postnatal	n=397, r=-.03, p=.5
One year postnatal	n=366, r=-.05, p=.3

Further analysis was conducted using the five percentile BMI bands outlined above. Kruscal-Wallis Test revealed no statistical significance between BMI bands and urinary symptom severity scores ( $H[4] = 3.44-10.13, p=.13-.48$ ). Finally, the relationship between BMI incremental bands and severity scores was analysed. Again, results did not reach statistical significance( $H[4] = 6.35 - 9.39, p=.14-.39$ ). .

Some respondents did have increasing postnatal severity scores over time (n=41, 13.3%) suggesting that their condition was in fact getting worse. Analysis was conducted using BMI as a continuous variable and Spearman Rank Order Correlation. For this group, there was a statistically significant positive correlation between severity score and BMI ( $r=.379, p=.017$ ), indicating that high BMI is a risk factor for increasing UI severity.

**4.9.2.2 Urinary incontinence**

An independent-samples t-test was conducted to compare BMI for the continent and incontinent group. At one year postnatal the mean BMI was not statistically significant for the continent group (M=25.45, SD=4.53) and incontinent group (M=25.25, SD=4.56;  $t(311)=.36, p=.72$ ) when considering “any incontinence.” However, when stress and urge incontinence were analysed separately, the urge incontinent group had a lower mean BMI (M= 24.31, SD= 5.17) compared to the



group who did not report urge incontinence ( $M = 25.67$ ,  $SD = 4.39$ ;  $t(311) = 2.19$ ,  $p = .02$ ). Stress incontinence was not significantly associated with mean BMI ( $p = .78$ ).

The relationship between BMI as a continuous independent variable and incontinence as a categorical dependent variable was analysed using biserial correlation coefficient. Analysis was conducted for stress incontinence, urge incontinence and any incontinence at each time interval. Results for any incontinence ( $r = -.02$ ,  $n = 313$ ,  $p = .67$  at one year) and stress incontinence ( $r = -.01$ ,  $p = .83$ ) did not reach statistical significance. However, results for urge incontinence support a small but significant negative correlation with BMI ( $r = -.16$ ,  $p = .04$ ) indicating that urge incontinence is associated with lower BMI.

The BMI - urge incontinence relationship was analysed using Kruskal-Wallis and Mann Whitney analysis and both percentile groups and incremental groups. In each case, statistical significance was not demonstrated for the antenatal results. However, reported rate of urge incontinence was significantly associated with the under 20 BMI band at 6 weeks ( $H[5] = 30.580$ ;  $p < .001$ , 99% CI  $< .001$ ). Results remained statistical significant throughout the postnatal year (Figure 4.12). Reported rates of urge incontinence were significantly higher in the  $<20$  BMI group, than in the two relatively “normal” BMI groups covering 21-30 ( $U = 1140$ ,  $r = -.42$ ,  $p < .001$ ). This effect was still evident at 6 months postnatal ( $U = 1220$ ,  $r = -.28$ ,  $p = .002$ ), although was no longer significant by one year. The BMI group  $>40$  was not used for comparison due to the small number of respondents in this group. However, BMI group 35-40 was used for comparison and compared again to the more “normal” BMI ranges of 21-30. This higher BMI group had significantly higher reported rates of urge incontinence at 6 weeks postnatal ( $U = 549$ ,  $r = -.26$ ,  $p = .005$ ). However, by 6 months, the difference no longer reached statistical significance.

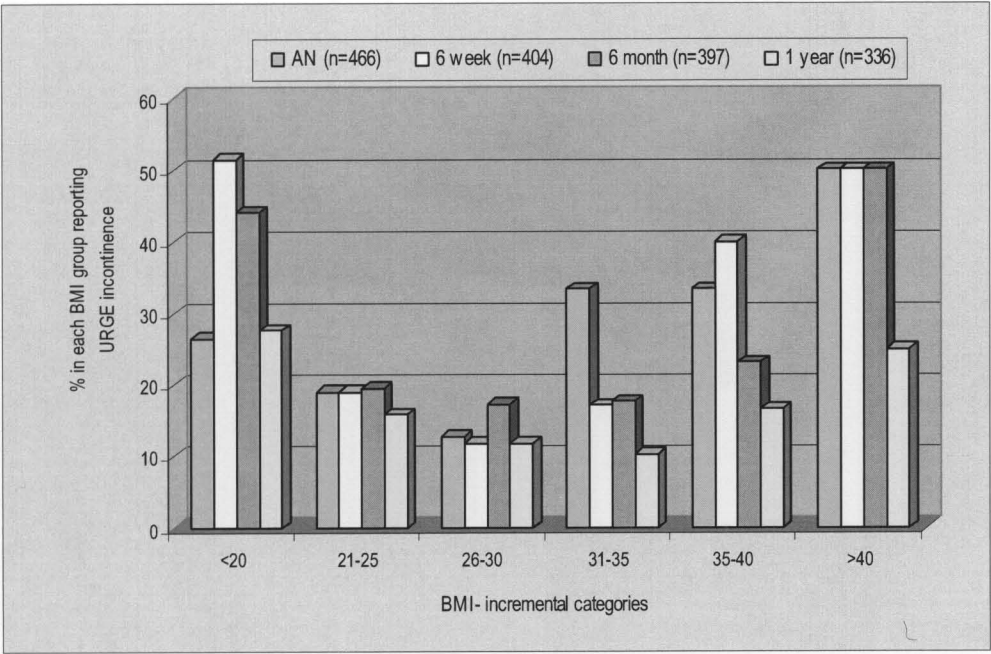


Figure 4.12: Reported rates of urge incontinence using incremental BMI categories.

Using the same percentile and incremental categories, the frequency of cases reporting stress incontinence for each BMI group was analysed using Chi Square. Antenatally, stress incontinence rates were significantly higher in the BMI>30 categories ( $\chi^2=9,501$ ; 4df;  $p=.05$ , Cramer's V .163). Differences in reported rates of stress incontinence did not reach statistical significance at any postnatal time interval (Figure 4.13). Although BMI>40 appears to have a higher rate, there were only four subjects in this group.



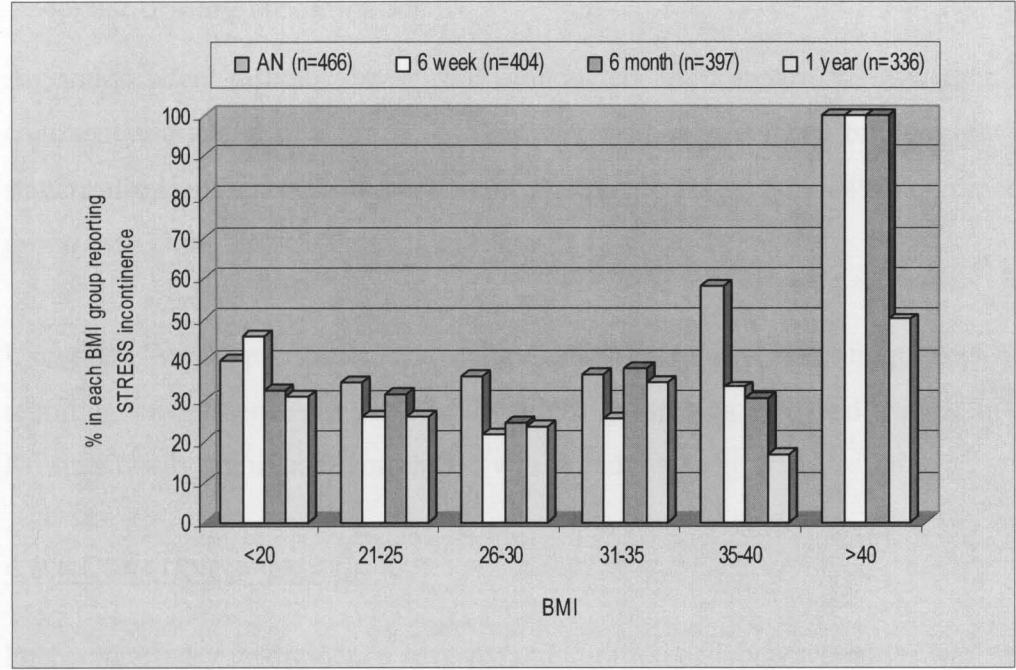


Figure 4.13: Reported rates of stress incontinence using incremental BMI categories

4.9.3 BIRTH WEIGHT

Birth weight analysis was conducted using both percentile categories and categories divided into 500g increments.

4.9.3.1 Severity scores

The relationship between UI severity scores and birth weight was investigated using Pearson product-moment correlation. There was no statistically significant correlation between birth weight and severity scores at any of the times investigated postnatally ( $r=-.09$ ,  $p=.09$ ).

A one-way between-groups ANOVA was conducted to explore the impact of birth-weight on incontinence severity score. Subjects were divided using the percentile and incremental categories outlined above. There was no statistically significant difference in the incontinence severity score for the seven groups ( $F 6, 296 =.9$ ,  $p=.49$ )

#### **4.9.3.2 Urinary incontinence**

An independent-samples t-test was conducted to compare birth-weight for the continent and incontinent group. At one year postnatal the mean birth-weight was not statistically significant for the continent group ( $M=3416g$ ,  $SD=4498$ ) and incontinent group ( $M=3328g$ ,  $SD=590$ ;  $t(301)= 1.3$ ,  $p=.19$ ).

Using the same percentile and incremental categories, the frequency of cases reporting incontinence for each birth-weight group was analysed using Chi Square. No statistically significant correlation was found.

#### **4.9.4 DURATION OF LABOUR**

Postnatal urinary incontinence severity and duration of labour variables were explored using standard multiple regression. Assumptions of multicollinearity were not violated. Duration of the first stage of labour, duration of the second stage of labour and total labour duration (first and second stage combined) were independent variables. The model only explained 0.3% of the variance with no labour duration variables reaching statistical significance ( $p=.48-.91$ ).

Pearson Chi-Square was also used to explore the relationship between total labour duration and specific urinary symptoms. No significant association was found between duration of first stage, duration of second stage, total duration (first and second stage combined) and any of the identified urinary symptoms at any of the three postnatal times investigated.

#### **4.9.5 BLADDER EMPTYING IN LABOUR**

Data on bladder emptying is presented in 2 hourly incremental time bands. Unlike percentile categories, there are differing numbers in each category and this should be born in mind when interpreting the data.

##### **4.9.5.1 Severity scores**

Kruskal-Wallis test was used to examine the maximum duration in the first stage of labour during which the bladder was not emptied, either by spontaneous void or

catheterisation, in relation to postnatal urinary severity measures. Bladder emptying was not a significant factor for urinary incontinence at 6 weeks and 6 months postnatal, but was statistically significant at one year, with women not having their bladder emptied for 6 hours or more during the first stage of labour, having greater severity scores ( $H[3]=8.045$ ;  $p=.042$ , 99% CI .037-.047). Further analysis using Spearman rho supported the correlation between duration of labour as a continuous variable and incontinence severity score ( $r=.24$ ,  $n=264$ ,  $p=.045$ ).

Further analysis using Kruskal-Wallis explored the relationship between bladder emptying prior to the second stage of labour and urinary incontinence severity scores. Again, those participants who did not empty their bladder for 6 hours or more prior to commencement of the second stage of labour reported greater severity ( $H[3]=7.903$ ;  $p=.043$ , 99% CI .037-.048). The result was still statistically significant when reduced to 4 hours without voiding ( $H[2]=7.902$ ;  $p=.019$ , 99% CI .017-.024).

Some respondents did have increasing severity scores over time ( $n=41$ , 13.3%) suggesting that their condition was in fact getting worse. For this group, there was a statistically significant positive correlation (Spearman rho) between severity score and time interval from bladder emptying to delivery. Particularly, those subjects who had not had their bladder emptied for 6 hours or more prior to delivery of the baby. ( $r=.46$ ,  $p=.021$ ).

#### 4.9.5.2 Urinary incontinence

Further analysis using Chi Square to explore frequencies of cases in each group revealed that bladder emptying prior to the start of the second stage of labour was also statistically significant for urinary incontinence. Those respondents who had not had their bladder emptied for more than 4 hours prior to commencement of the second stage of labour had:

- Higher rates of “any” incontinence at 6 weeks postnatal ( $\chi^2=4.598$ , 1df,  $p=.032$ , Cramer’s  $V=.130$ ).
- Higher rates of “any” incontinence at 6 months postnatal ( $\chi^2=3.843$ , 1df,  $p=.05$ , Cramer’s  $V=.122$ ).

- Higher rates of “any” incontinence at one year ( $\chi^2=5.202$ , 1df,  $p=.023$ , Cramer’s  $V=.154$ ).
- Increased stress incontinence at one year ( $\chi^2=10.663$ , 1df,  $p=.001$ , Cramer’s  $V=.221$ ).

Put more simply, those respondents who did not have their bladder emptied for more than 4 hours prior to the start of the second stage of labour, were 1.94 times more likely to report “any” urinary incontinence and 2.36 times more likely to report stress incontinence at one year postnatal, based on probability analysis. This is clearly visible in Figure 4.14. The total number in each group is given on the X axis (emergency caesarean in the first stage of labour are not included).

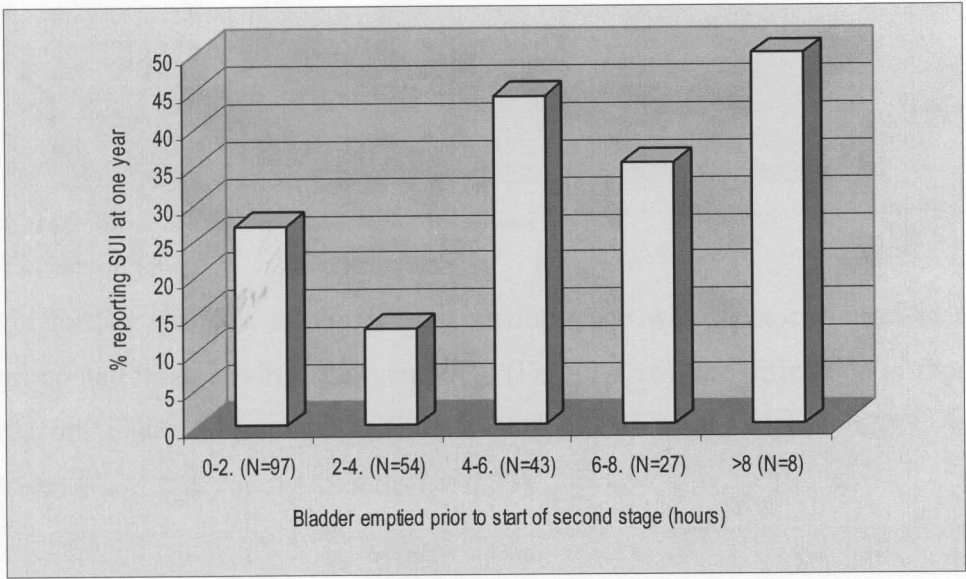


Figure 4.14: Stress incontinence at one year and time from bladder emptying to start of 2<sup>nd</sup> stage of labour

**4.9.6 MODE OF DELIVERY**

**4.9.6.1 Severity score**

Using Kruskal-Wallis test mode of delivery in relation to postnatal urinary incontinence severity measures was analysed. Mode of delivery was not found to be statistically significant ( $H[4]=5.134$ ;  $p=.27$ , 99% CI .26-.27 at six weeks postnatal).

4.9.6.2 Urinary incontinence

The frequency distribution of urinary incontinence in each mode of delivery group was compared using Pearsons Chi-Square. Rates of incontinence were significantly different for each mode of delivery ( $X^2=13.443$ , 4df,  $p=.009$ , Cramer's  $V=.188$ ) as illustrated in Figure 4.15.

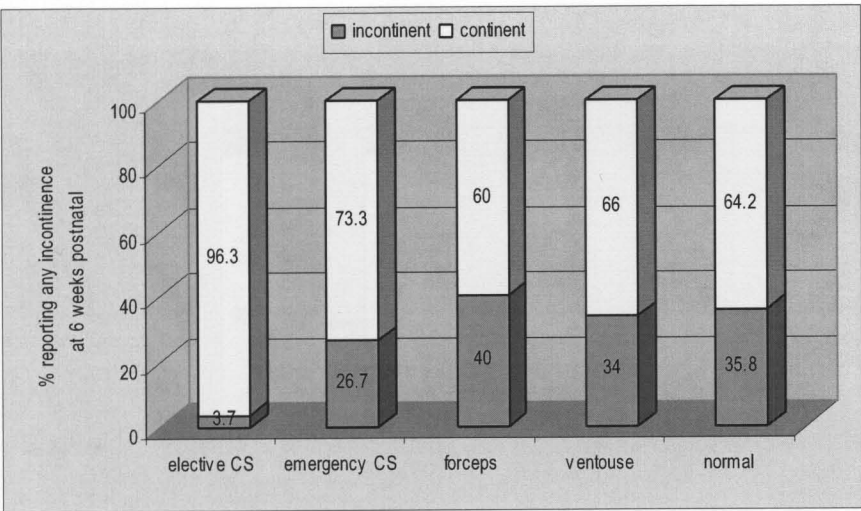


Figure 4.15: Reported rates of urinary incontinence at 6 weeks postnatal

On further analysis, although urge incontinence was more common in the forceps group and those having emergency CS (Figure 4.16), the difference in reporting rates did not reach statistical significance at 6 weeks postnatal ( $X^2=6.653$ , 4df,  $p=.155$ , Cramer's  $V .132$ ) or at 6 months ( $p=.327$ ).

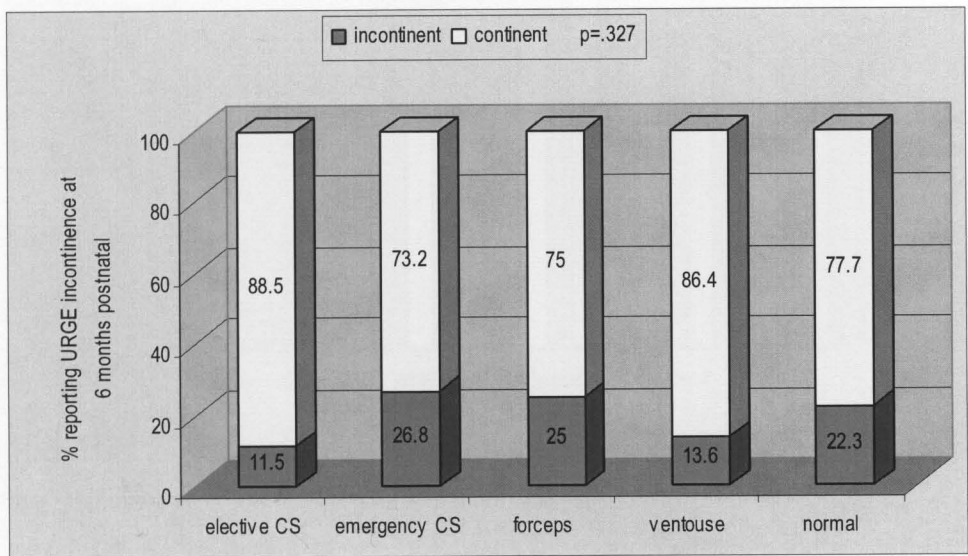


Figure 4.16: Reported rates of urge incontinence at 6 months postnatal

Stress incontinence on the other hand, was significantly associated with mode of delivery at 6 weeks ( $X^2= 12.577$ , 4df,  $p=.014$ , Cramer's  $V=.181$ ) and at 6 months postnatal ( $X^2= 10.575$ , 4df,  $p=.031$ , Cramer's  $V=.171$ ), as illustrated in Figures 4.17 and 4.18, with those undergoing delivery by forceps reporting higher rates of stress incontinence. Cervical dilatation at the time of emergency CS was not a significant factor. Results remain significant at one year postnatal.

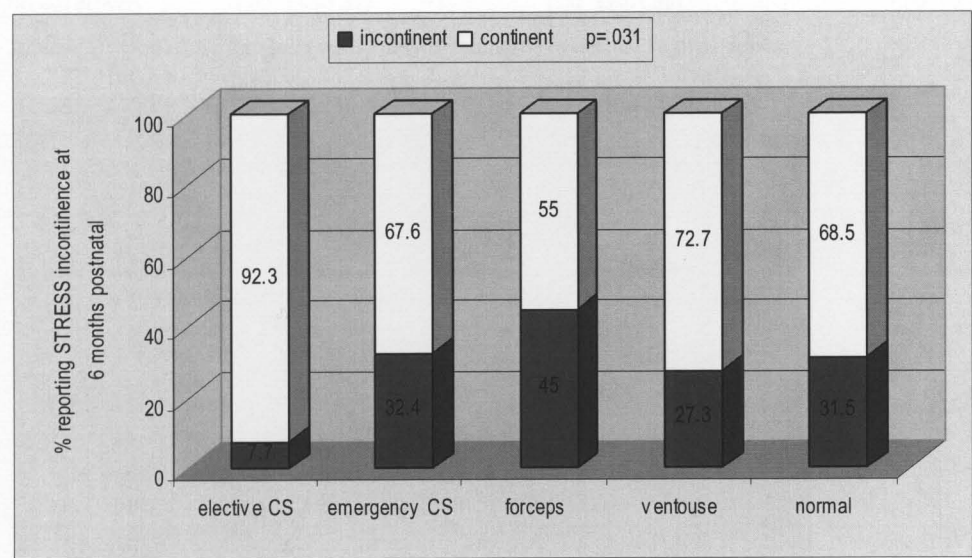


Figure 4.17: Reported rates of stress incontinence at 6 months postnatal

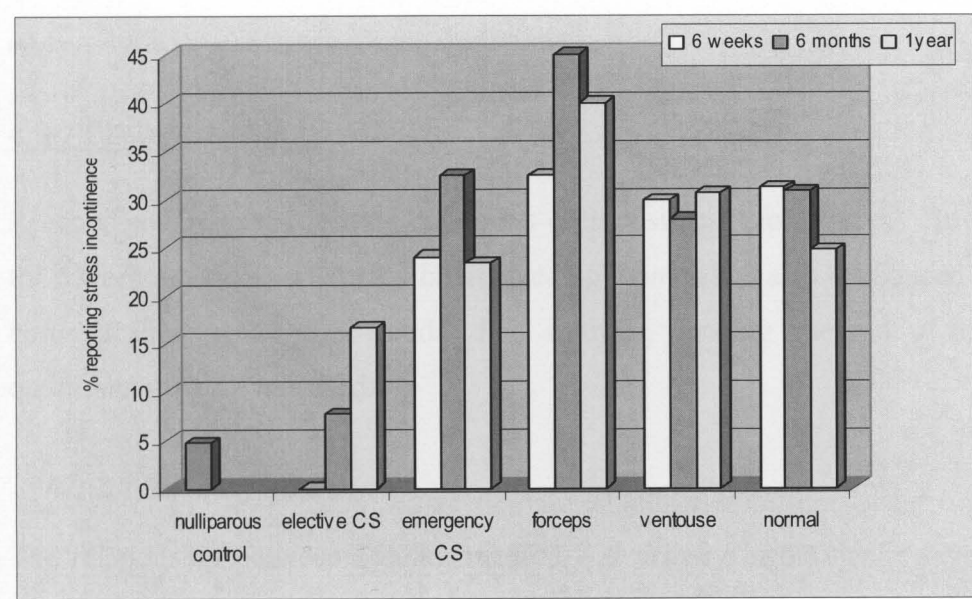


Figure 4.18: Reported rates of stress incontinence and mode of delivery for the three postnatal time intervals



The odds ratio for developing stress incontinence for specific modes of delivery, compared to a normal vaginal delivery is summarised in Table 4.11, (95% CI) and presented in Figure 4.19.

Mode of Delivery	Odds Ratio for stress incontinence at 6 weeks postnatal	Odds ratio for stress incontinence at 6 months postnatal	Odds ratio for stress incontinence at one year postnatal
Elective CS	0.00	0.16 (.04-.74)	0.63 (.21-1.91)
Emergency CS	0.55 (.32-.99)	1.11 (.63-1.91)	0.97 (.50-1.87)
Forceps	0.91 (.45-1.83)	2.04 (1.06-3.96)	2.41 (1.27-5.23)
Ventouse	0.79 (.40-1.54)	0.55 (.28-1.11)	1.44 (.65-3.19)
Normal delivery	1.00 (.64-1.57)	1.00 (.64-1.56)	1.00 (.83-1.15)

Table 4.11: Odds ratio for stress incontinence compared to normal vaginal delivery

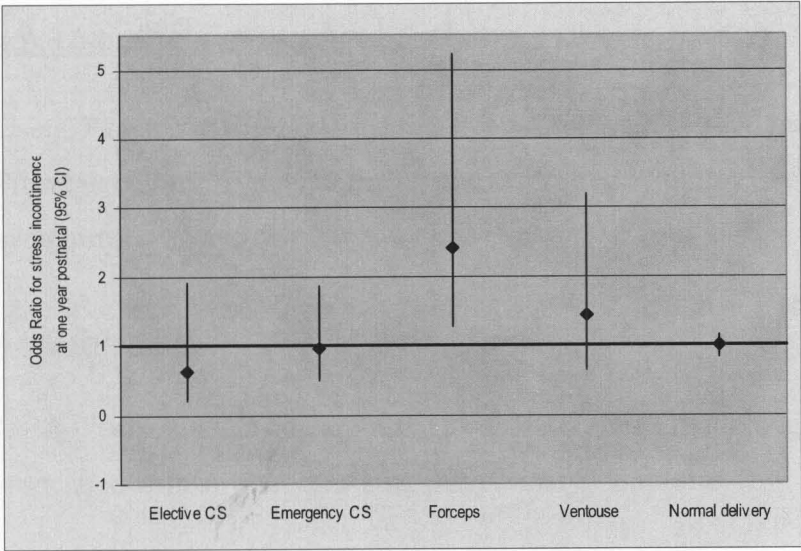


Figure 4.19: Odds ratio for stress incontinence at one year and mode of delivery

4.9.7 FEEDING METHOD

Respondents indicated feeding method at each postnatal time interval. However, after the 6 week questionnaire, many breast-feeding women had also introduced a degree of bottle feeding and other foods. For analysis, feeding method at the 6-week questionnaire only was used.

4.9.7.1 Severity scores

The relationship between feeding method and urinary incontinence severity scores was explored using Mann-Whitney test. Whilst bottle feeding (M=9.09) appeared to offer some small protective effect when compared to breast feeding (M=13.7) for UI severity, the practical significance of this is limited, given that those breast feeding

would probably have different dietary and fluid intake to those bottle feeding (U=11041,  $r=.1$ ,  $p=.01$ )

#### **4.9.7.2 Urinary incontinence**

The relationship between breast or bottle feeding and reported urinary symptoms was examined using Pearson Chi-Square. Incontinence rates were not significantly different in the feeding method groups ( $\chi^2= 1.42$ , 1df,  $p=.23$ , Cramer's  $V= .06$  at 6 weeks postnatal).

#### **4.9.8 INDUCTION OF LABOUR**

Using Pearson's Chi-Square test, it was determined that induction of labour with Prostaglandin or Syntocinon was not associated with any short or long-term urinary symptoms.

#### **4.9.9 EPIDURAL**

Using Pearson's Chi-Square test, it was determined that epidural anaesthesia was not associated with any short or long-term urinary symptoms.

#### **4.9.10 SMOKING**

##### **4.9.10.1 Severity scores**

Mann-Whitney test demonstrated that smoking was not significantly associated with urinary severity measures (U=8628,  $r=.05$ ,  $p=.26$ ) . Further analysis using Spearman's Rank correlation examined number of cigarettes smoked and severity scores. Again, no significant results were found.

##### **4.9.10.2 Urinary incontinence**

Pearson's Chi-Square revealed no statistically significant correlations between smoking and urinary incontinence.



4.9.11 PERINEAL TRAUMA

Information on perineal trauma was available for 398 respondents as summarised in Table 4.12.

deliverymode * DEGREE OF PERINEAL TEAR Crosstabulation								
			DEGREE OF PERINEAL TEAR					Total
			intact	1st	2nd	3/4th	episiotomy	
deliverymode	elective	Count	27	0	0	0	0	27
		% within deliverymode	100.0%	.0%	.0%	.0%	.0%	100.0%
	emergency	Count	71	2	0	0	3	76
		% within deliverymode	93.4%	2.6%	.0%	.0%	3.9%	100.0%
	forceps	Count	0	1	1	0	39	41
		% within deliverymode	.0%	2.4%	2.4%	.0%	95.1%	100.0%
	ventouse	Count	0	1	5	1	44	51
		% within deliverymode	.0%	2.0%	9.8%	2.0%	86.3%	100.0%
	normal	Count	41	33	65	6	58	203
		% within deliverymode	20.2%	16.3%	32.0%	3.0%	28.6%	100.0%
	Total	Count	139	37	71	7	144	398
		% within deliverymode	34.9%	9.3%	17.8%	1.8%	36.2%	100.0%

Table 4.12: Perineal trauma and delivery mode

As seen above, the majority of recognised 3/4<sup>th</sup> degree tears occur during normal vaginal delivery (85.7%).

4.9.11.1 Severity scores

The association between the degree of perineal trauma and postnatal urinary incontinence severity measures was explored using Kruskal-Wallis test and was not found to be statistically significant (H[4]= 4.28; p=.38, 99% CI .37-.39 at six weeks postnatal).

4.9.11.2 Urinary Incontinence

Perineal trauma was significantly associated with urinary incontinence at 6 weeks postnatal ( $X^2=19.709$ , 4df,  $p=.001$ , Cramer’s V=.226), 6 months postnatal ( $X^2=13.138$ , 4df,  $p=.011$ , Cramer’s V=.189) and at one year postnatal ( $X^2=12.156$ , 4df,  $p=.016$ , Cramer’s V=.197).

Further investigation using Pearson’s Chi-Square revealed that urge incontinence was not significant and the results reflected reported rates of stress incontinence. Figure 4.20 illustrates stress incontinence rates for each classification of perineal trauma at

the three postnatal time intervals. Results were statistically significant at 6 weeks, ( $X^2 = 21.945$ , 4df,  $p < .005$ , Cramer's  $V = .238$ ), 6 months ( $X^2 = 15.197$ , 4df,  $p = .004$ , Cramer's  $V = .204$ ) and also at one year ( $X^2 = 12.156$ , 4df,  $p = .016$ , Cramer's  $V = .197$ ), with highest rates of stress incontinence found in the 3/4<sup>th</sup> degree tear and episiotomy groups. As Table 4.12 above shows, this degree of perineal trauma is not associated with instrumental delivery, but often associated with normal vaginal delivery. Perineal trauma, specifically 3/4<sup>th</sup> degree tears and episiotomy, is a risk factor for postnatal urinary incontinence independent of delivery mode.

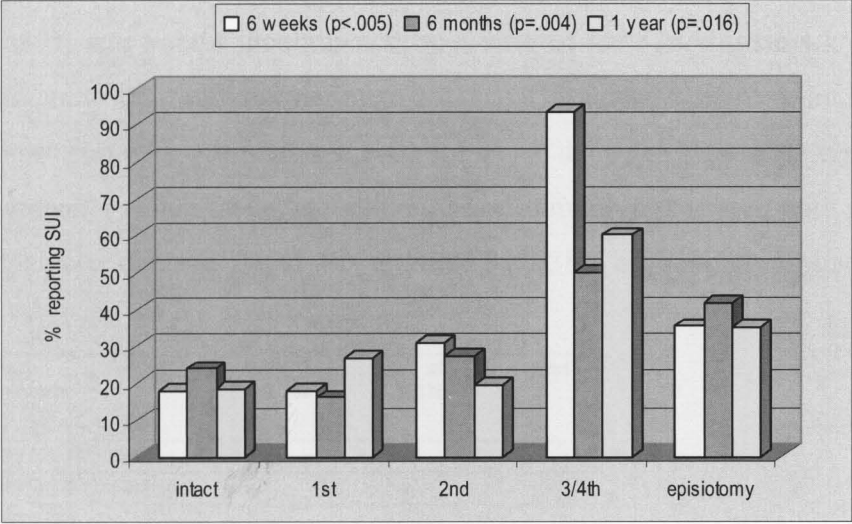


Figure 4.20: Reported rates of stress incontinence and degree of perineal trauma for the three postnatal time intervals

In some cases, the description of the perineal repair did not appear to match the documentation regarding suturing. For example, perineal trauma may be classed as first degree but the repair detailed sutures to perineal muscle. These cases were excluded from the above analysis as the accuracy of the variable was in considerable doubt. In addition, some perineal trauma was sutured, whilst other was not. Further correlations were performed using Pearson's Chi-Square to compare incontinence with perineal, vaginal wall and labial sutures.

The presence of vaginal wall sutures significantly increased the rates of reported urinary incontinence at 6 weeks postnatal (70.7% vs. 54%;  $X^2 = 9.732$ , 1df,  $p = .002$ , Cramer's  $V = .159$ ), in particular, stress incontinence (72.6% vs. 54.3%; ( $X^2 = 10.736$ , 1df,  $p = .001$ , Cramer's  $V = .167$ ).

The presence of perineal sutures significantly increased the rates of reported urinary incontinence at 6 weeks postnatal (66.7% vs. 47.9%;  $X^2=11.867$ , 1df,  $p=.001$ , Cramer’s  $V=.175$ ), in particular, stress incontinence (68.9% vs. 48.2%; ( $X^2=13.200$ , 1df,  $p<.005$ , Cramer’s  $V=.185$ ). Results were still significant at 6 months, but not so at one year. Labial sutures were not significant.

4.10 PREVALENCE OF POSTNATAL ANAL INCONTINENCE

Tables 4.13 and 4.14 together with Figure 4.21 show prevalence rates for anal and faecal incontinence symptoms, one year postnatal. Anal incontinence was reported by 9.39% and Faecal incontinence by 6.97% of the 336 women who responded. Faecal urgency was the most common and most frequent symptom. Faecal urgency relates most commonly to external anal sphincter damage<sup>218</sup> and was reported by 8.03% of women. Passive faecal incontinence is commonly associated with smooth muscle anal sphincter damage<sup>218</sup> and was reported by 2.38% of the total respondents.

Anal incontinence symptom	Total effected	% of all replies (N=336)
Any anal incontinence	31	9.39
Any faecal incontinence	23	6.97
Flatus only	8	2.42

Table 4.13: Prevalence of anal and faecal incontinence at one year postnatal

Anal incontinence symptom	% of all replies (N=336)	Frequency of symptoms of those effected (n=31)				
		Never	Occasionally	Sometimes	Most of the time	Always
Urgency	8.03 (n=27)	12.9%	35.5%	29.0%	22.6%	0%
Faecal incontinence when sneezing	3.86 (n=13)	58.1%	16.1%	16.1%	6.5%	3.2%
Faecal incontinence at rest	2.38 (n=8)	74.2%	9.7%	12.9%	3.2%	0%
Can't keep clean	5.65 (n=19)	38.7%	25.8%	25.8%	9.7%	0%
Leak loose stool	5.95 (n=19)	35.5%	25.8%	29.0%	6.5%	3.2%
Leak solid stool	4.46 (n=15)	51.6%	16.1%	22.6%	6.5%	3.2%
Intercourse incontinence	0.59 (n=2)	93.5%	0%	6.5%	0%	0%
Faecal incontinence when walking	2.08 (n=7)	77.4%	9.7%	6.5%	6.5%	0%
Flatus incontinence	6.84 (n=23)	25.9%	29%	19.3%	22.6%	3.2%

Table 4.14 : Prevalence and severity of anal incontinence symptoms at one year postnatal

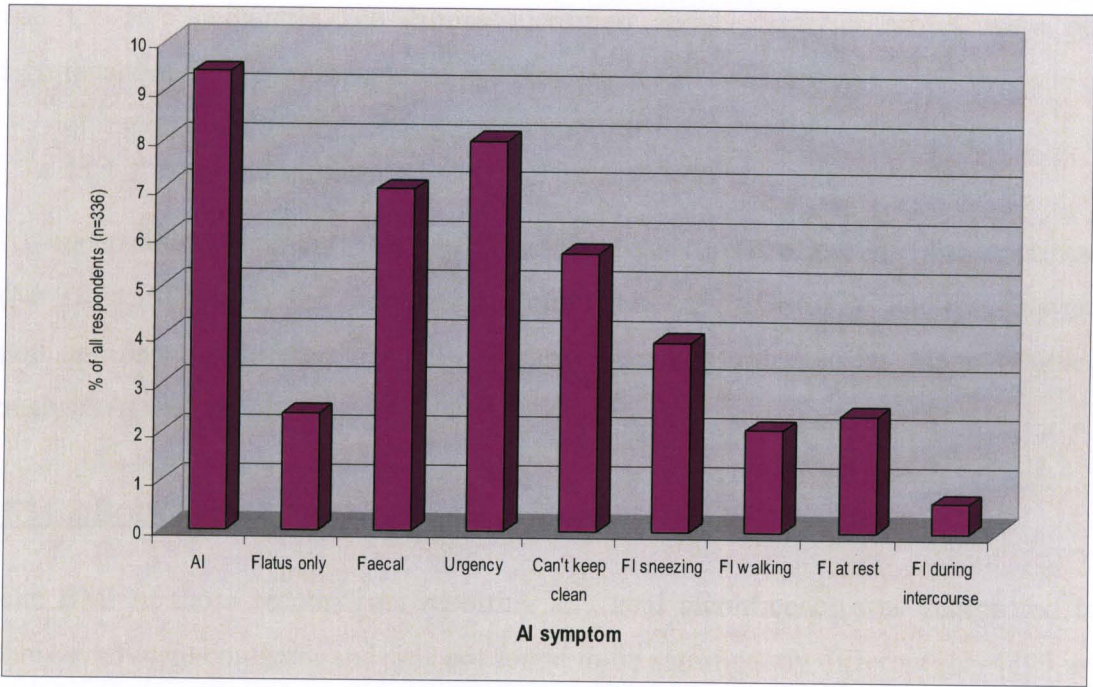


Figure 4.21: Prevalence of anal incontinence (AI) and faecal incontinence (FI) symptoms

**4.11 MATERNAL, FETAL OR SOCIAL VARIABLES THAT WILL INFLUENCE THE PREVALENCE RATES AND DEGREE OF ANAL INCONTINENCE POSTNATALLY**

This section will examine non-obstetric and obstetric risk factors for the development of anal incontinence. The correlation between age, BMI and baby birth weight with anal incontinence was explored using three approaches. Firstly, the potential risk factor was examined as a continuous variable. Secondly, the potential risk factor was divided into equal percentiles. Finally, the risk factor was divided into incremental categories. This approach was used to enable results to be compared to other published research and also to enable further statistical analysis to be undertaken.

**4.11.1 AGE**

**4.11.1.1 Severity scores**

The relationship between AI severity scores and age as a continuous variable was investigated using Spearman Rank Order Correlation. No significant association was found ( $r=-.01$ ,  $n=402$ ,  $p=.83$ ). Further analysis was conducted using Kruscal-Wallis test

and the five percentile age groups identified above. Severity scores were not significantly affected by the age ( $H[4]=5.24$ ;  $p=.26$ , 99% CI .25-.28).

#### **4.11.1.2. Anal incontinence**

An independent-samples t-test was conducted to compare age for the continent ( $M=27.28$ ,  $SD=5.84$ ) and incontinent group ( $M=27.59$ ,  $SD=6.23$ ). The results were not significantly different ( $p=.79$ ). Results were confirmed using Mann-Whitney analysis ( $(U=5389, r=.001, p=.9)$

#### **4.11.2 BODY MASS INDEX**

The BMI of those respondents reporting any anal incontinence was compared to those who were continent and was not found to be significantly different ( $U=4890, r=.04, p=.37$ ).

##### **4.11.2.1 Severity scores**

The relationship between faecal incontinence severity scores and BMI was investigated using Spearman Rank Order Correlation and also Kendall's Tau. There was no statistically significant correlation between BMI and severity scores ( $r=.03, p=.44$ ).

Postnatal anal incontinence was explored using standard multiple regression. Assumptions of multicollinearity were not violated with tolerance levels of .883 and VIF 1.13 – 1.15. Correlation between variables was low; BMI and age .274, BMI and birth weight .279, age and birth weight .306. One outlier was identified with a higher severity score than expected. Cook's distance remained less than one so this is not problematic to the model. The model explained 3.4% of the variance in severity measures for anal incontinence. Whilst BMI made the largest contribution, it did not reach statistical significance ( $p=.4$ ).

Further analysis was conducted using the five BMI percentile bands outlined above. Kruskal-Wallis test revealed that respondents with a BMI  $\geq 30$  had a significantly higher faecal incontinence severity score ( $H[4]=10.755$ ;  $p=.029$ , 99% CI .031-.041). This finding was confirmed when incremental BMI groups were used and mean



severity scores compared. Again, Kruskal-Wallis test was used. BMI>30 had significantly higher mean faecal incontinence severity scores than any other group ( $H[4]=10.738$ ;  $p=.034$ , 99% CI .030-.039).

4.11.2.2. Anal incontinence

BMI percentile and incremental bands were assessed individually using Pearson’s Chi Square. There was a significant difference in the BMI band of those reporting anal incontinence symptoms ( $X^2=10.141$ , 4df,  $p=.035$ ) with BMI group 23 and BMI >30 groups having the highest prevalence rates (Figure 4.22). These groups also had significantly more faecal urgency ( $X^2=28.305$ , 4df,  $p=.035$ ).

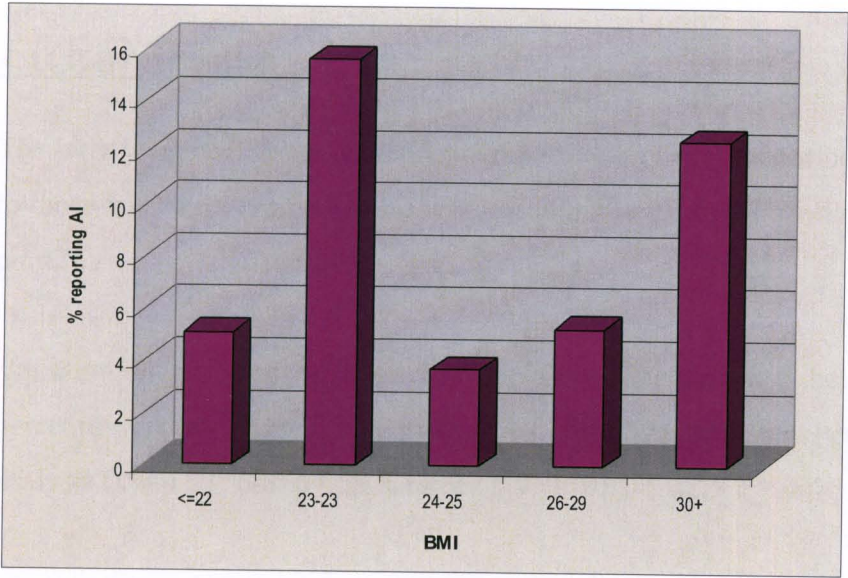


Figure 4.22: BMI band and reported rates of anal incontinence

However, BMI 23 is the smallest group size, and although statistically significant, the findings do not support a trend in prevalence within the BMI spectrum, nor is there a physiological explanation for this finding. When analysed again using incremental BMI categories, the results are not statistically significant (Figure 4.23).

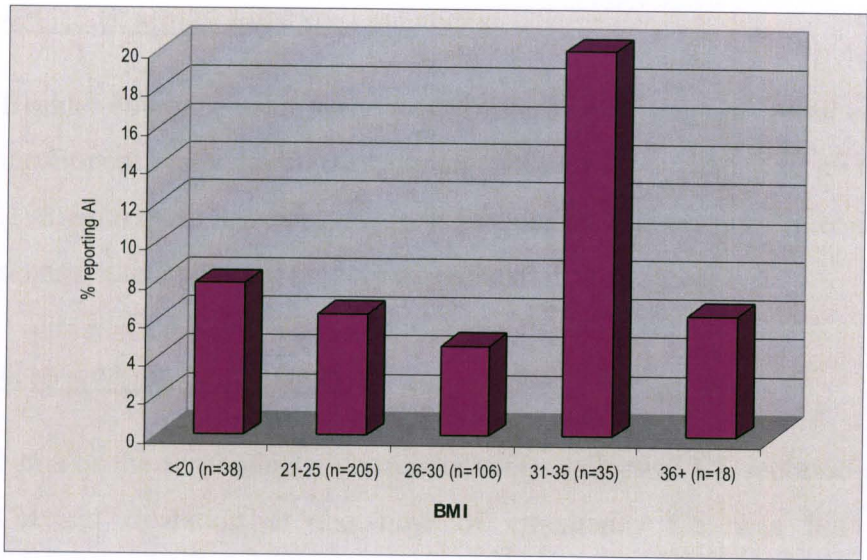


Figure 4.23: BMI incremental band and reported rates of anal incontinence

4.11.3 BIRTH WEIGHT

The birth weight of those respondents reporting any anal incontinence was compared to those who were continent and was not found to be significantly different (U=4451, p=.42).

Variation in reported rates on anal or faecal incontinence between birth weight percentile groups did not reach statistical significance using Pearson’s Chi-Square analysis ( $\chi^2=4.71$ ; 6df; p=.58, Cramer’s V .110).

Analysis of birth weight was repeated using incremental bands increasing by 500g. Although birth weight under 2500g seemed to be protective, results did not reach statistical significance ( $\chi^2=4.75$ ; 7df; p=.69, Cramer’s V .110).

4.11.2 DURATION OF LABOUR

Duration of first stage of labour, second stage of labour or total labour did not reach statistically significance for the development of faecal incontinence or anal incontinence.

4.11.3 BLADDER EMPTYING IN LABOUR

Bladder emptying prior to the onset of the second stage of labour correlated with anal incontinence and was statistically significant ( $X^2=11.066$ , 4df,  $p=.026$ , Cramer’s V = .198) with those not emptying their bladder for 6 hours prior to commencement of the second stage reporting higher rates of anal incontinence.

4.11.4 MODE OF DELIVERY

None of the respondents who underwent an elective CS reported anal incontinence. Cervical dilatation at the time of emergency CS was not significant. Anal incontinence was significantly associated with normal delivery ( $X^2 = 26.935$ , 3df,  $p<.001$ ). Table 4.15 illustrates the mode of delivery for all those reporting anal incontinence and also gives the odds ratio for developing anal incontinence for each mode of delivery (based on all replies). The odds ratio for any vaginal delivery is 1.48 (95% CI 0.59-3.72).

Mode of Delivery	N (with AI)	% (all with AI n=31)	Odds Ratio for AI with mode of delivery (all deliveries n=336)	95% CI for Odds Ratio
Elective CS	0	0%	0	0
Emergency CS	6	19.40%	0.57	0.22-1.44
Forceps	3	9.70%	0.52	0.12-1.77
Ventouse	2	6.50%	0.25	0.05-1.05
Normal	20	64.50%	1	0.47-2.15
TOTAL	31	100%		

Table 4.15: Mode of delivery for all those reporting anal incontinence

4.11.5 FEEDING METHOD

Feeding method was not significantly associated with anal or faecal incontinence ( $x^2=.20$ ; 1df;  $p=.65$ , Cramer’s V .023)..



4.11.6 INDUCTION OF LABOUR

4.11.6.1 Severity scores

The relationship between faecal incontinence severity scores and number of doses of vaginal Prostaglandin was investigated using Spearman Rank Order Correlation. There was a small, positive correlation between the two variables ( $r = .125$ ,  $n = 399$ ,  $p = .01$ ).

4.11.6.2 Anal and faecal incontinence

A significant correlation was found between induction of labour and anal incontinence symptoms ( $\chi^2 = 7.46$ , 1df,  $p = .006$ , Cramer's  $V = .154$ ) or faecal incontinence ( $\chi^2 = 5.924$ , 1df,  $p = .015$ , Cramer's  $V = .137$ ) with 12.1% of patients who were induced developing faecal incontinence, compared to 4.6% of the spontaneous labour group (Figure 4.24). This gives an odds ratio for developing anal incontinence when labour is induced of 3.26 (95% CI 1.56-6.84) with a relative risk of 2.95. The odds ratio for developing faecal incontinence when induced is 3.24 (95% CI 1.38-7.62) with a relative risk of 3.01.

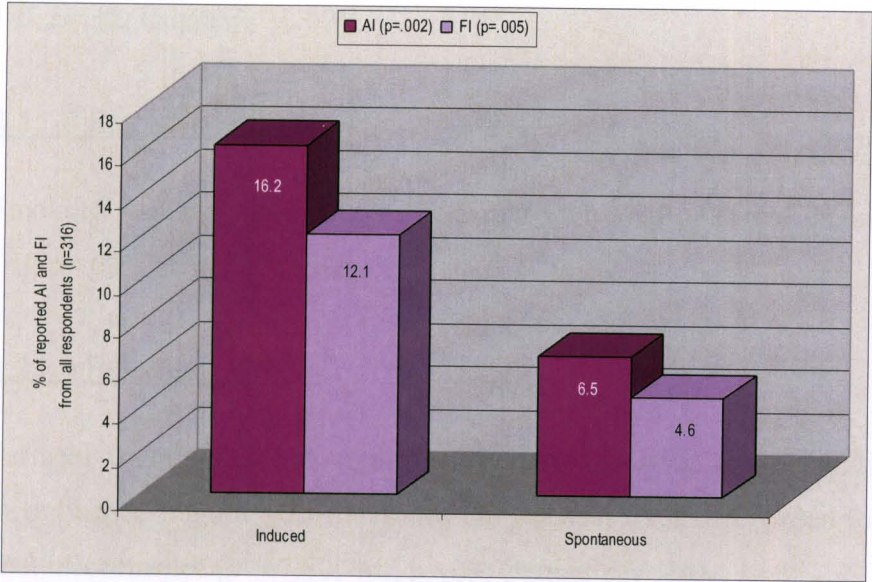


Figure 4.24: Incidence of anal incontinence symptoms in induced and spontaneous labours

Mode of delivery for both the induced and spontaneous respondents reporting anal incontinence is summarised in Table 4.16.

Mode of delivery of respondents with anal incontinence	% with spontaneous labour	% induced
Normal (n=20)	55.5	44.5
Forceps (n=3)	33.3	66.7
Ventouse (n=2)	0.0	100
Emergency CS (n=6)	16.6	83.3

Table 4.16: Mode of delivery and anal incontinence

An independent samples t-test was conducted to compare the birth weight of those in the induced group with those in the spontaneous group. There was no significant difference in birth weight for spontaneous ( $M=3,355g$ ,  $SD\ 512.7$ ) and induced ( $M=3,445g$ ,  $SD\ 589.2$ ;  $t(388) = -1.538$ ,  $p=.125$ ).

Using Mann-Whitney U test, age and BMI of the induced and the spontaneous group were compared. There was no statistically significant difference in age ( $U=16507$ ,  $r=.02$ ,  $p=.59$ ) or BMI ( $15484$ ,  $r=.07$ ,  $p=.13$ ) for spontaneous and induced groups.

#### 4.11.7 EPIDURAL

Epidural was not significantly associated with anal or faecal incontinence ( $\chi^2 = 2.37$ ; 1df;  $p=.12$ , Cramer's  $V\ .07$ ).

#### 4.11.8 SMOKING

Smoking was not significantly associated with anal or faecal incontinence ( $\chi^2 = .23$ ; 1df;  $p=.63$ , Cramer's  $V\ -.02$ ).

#### 4.11.9 PERINEAL TRAUMA

Perineal trauma did not significantly correlate with anal incontinence or faecal incontinence. Figure 4.25 illustrates the perineal trauma recorded for those reporting anal incontinence ( $\chi^2 = 7.80$ ; 4df;  $p=.09$ , Cramer's  $V\ .14$ ).

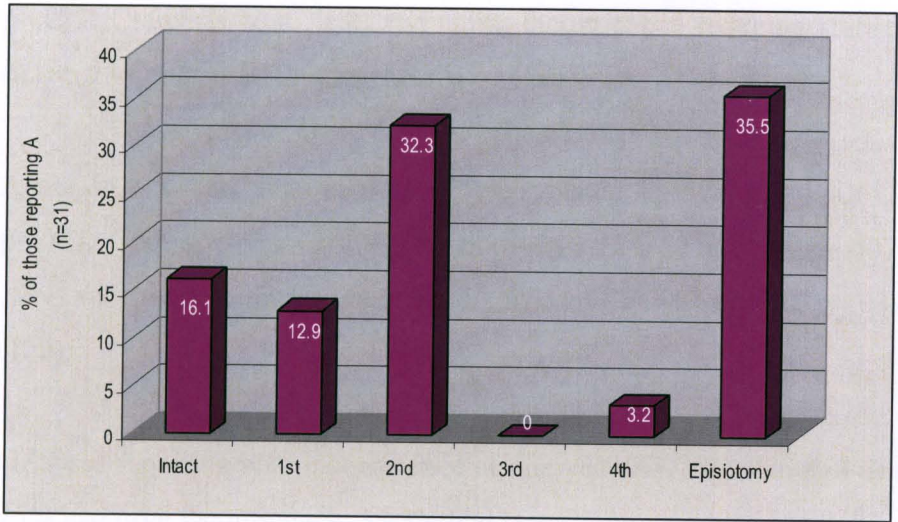


Figure 4.25: Perineal trauma of those reporting anal incontinence.

Seven patients (1.7% of all respondents) had a recognised 3<sup>rd</sup> or 4<sup>th</sup> degree tear. Only one of these, the respondent with the 4<sup>th</sup> degree tear, reported faecal incontinence.

4.11.10 CORRELATION BETWEEN URINARY AND ANAL INCONTINENCE

4.11.10.1 Severity scores

Faecal incontinence severity at one year and UI severity at 6 weeks correlated significantly ( $r=.189$ ,  $p<.005$ ) when analysed using Spearman rho. The result remained statistically significant at 6 month postnatal ( $r=.258$ ,  $p<.005$ ) and at one year postnatal ( $r=.322$ ,  $p<.005$ ).

4.11.10.2 Incontinence

Correlation between urinary and anal incontinence symptoms were explored using Pearson’s Chi-Square. There was a significant correlation between “any” incontinence at 6 weeks postnatal and anal incontinence symptoms at one year ( $X^2=6.12, 1df$ ,  $p=.013$ , Cramer’s  $V=.124$ ). Urge incontinence was not significant but stress incontinence was ( $X^2=5.021$ ,  $1df$ ,  $p=.021$ , Cramer’s  $V=.115$ ).

The correlation between anal incontinence at one year and UI at 6 months remained significant ( $X^2=6.003$ ,  $1df$ ,  $p=.014$ , Cramer’s  $V=.126$ ) with urge ( $X^2=4.535$ ,  $1df$ ,

$p=.033$ , Cramer's  $V = .109$ ) and stress incontinence reaching statistical significance ( $X^2=5.234$ , 1df,  $p=.022$ , Cramer's  $V = .118$ ).

Again, at one year, anal incontinence correlated significantly with UI ( $X^2=8.385$ , 1df  $p=.004$ , Cramer's  $V = .162$ ), with both urge ( $X^2=7.157$ , 1df,  $p=.007$ , Cramer's  $V = .149$ ) and stress incontinence being significant ( $X^2=4.617$ , 1df,  $p=.032$ , Cramer's  $V = .120$ ).

Of those reporting anal incontinence at one year, 68.75% also had urinary symptoms. 25% had urge incontinence. 37.5% had stress incontinence.

## **4.12 THE IMPACT OF POSTNATAL URINARY INCONTINENCE ON QUALITY OF LIFE**

### **4.12.1 GENERAL HEALTH**

The first part of the Kings Health Questionnaire deals with general health and incontinence impact. The general health score is based on respondent's perception of their general health at the time of completing the questionnaire. A five point Likert scale ranges from very good to very poor. The higher the score, the worse the perceived general health. A score of 0 represents very good general health. A score of 25 represents good, 50 represents fair, 75 represents poor and 100 represents very poor. Figure 4.26 illustrates the mean general health score for UI symptoms over the four time periods investigated.



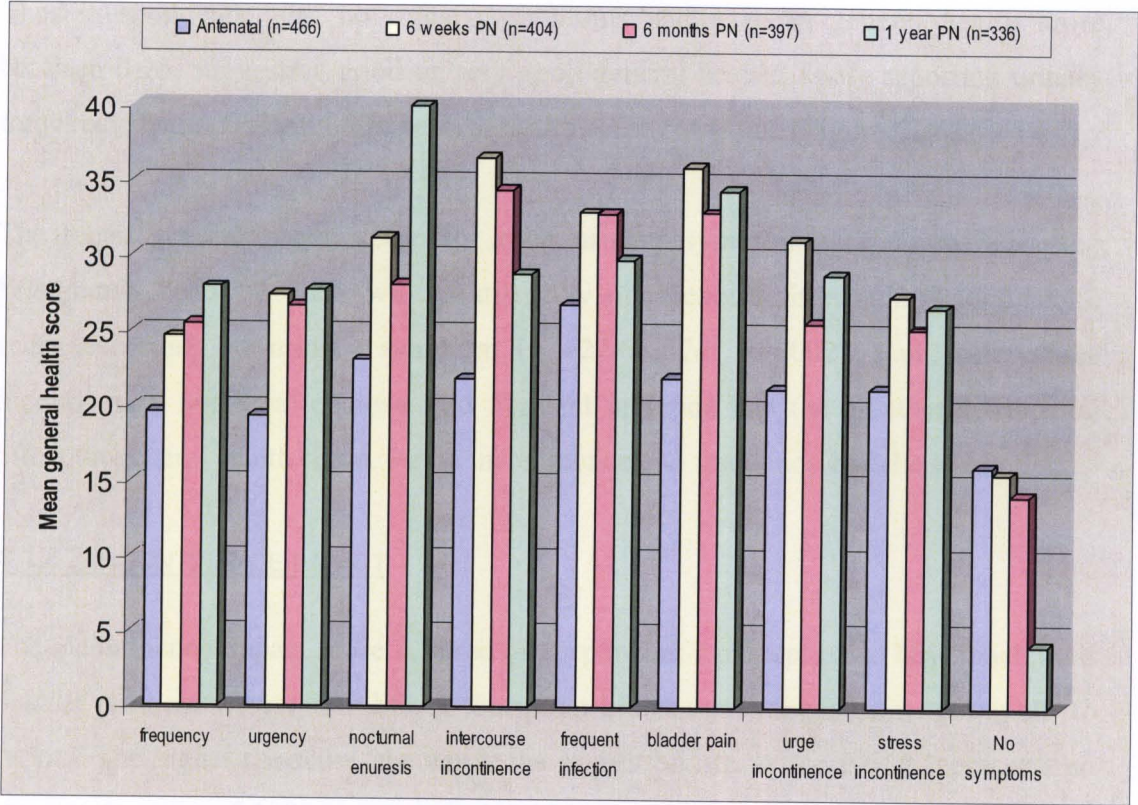


Figure 4.26: General health score and UI symptoms

4.12.1.1 Urinary symptoms and general health score over time

Antenatally, most respondents indicated a general health score of 0-25, suggesting good to very good general health. Only those with frequent urinary infection were above this, with a mean score of 26.84.

At 6 weeks postnatal, perception of general health tended to be worse, with almost all respondents reporting urinary symptoms having a general health score between 25 and 50 (good – fair). Intercourse incontinence (36.54) and bladder pain (35.98) had the highest mean scores. This pattern remained largely the same at 6 months postnatal.

By one year postnatal, those without symptoms were reporting very good general health with a mean score of 4.16. In contrast, those with urinary symptoms were reporting mean general health scores between 25 and 50, with nocturnal enuresis (40) and bladder pain (34.38) having the highest mean general health scores.

Those respondents with no urinary symptoms had a mean general health score between 0-25, suggesting good or very good general health. Those reporting urinary frequency, had deterioration in general health score over time (Figure 4.26).

The mean general health score for each urinary symptom was compared using Friedman's ANOVA. There was a statistically significant difference in general health score according to urinary symptom ( $X^2=22.63$ , 7df,  $p=.002$ ). Pain, intercourse incontinence, nocturnal enuresis and frequent infection had the greatest detrimental effect on general health score. Stress incontinence and frequency had the least effect.

#### 4.12.2 INCONTINENCE IMPACT

The incontinence impact score is based on respondent's perception of how much their bladder problem affects their life. A four point Likert scale ranges from "not at all" to "a lot." The higher the score, the worse the impact on life. A score of 0 represents no impact. A score of 100 represents a lot of impact. Figure 4.27 illustrates the mean incontinence impact score for UI symptoms over the four time periods investigated.

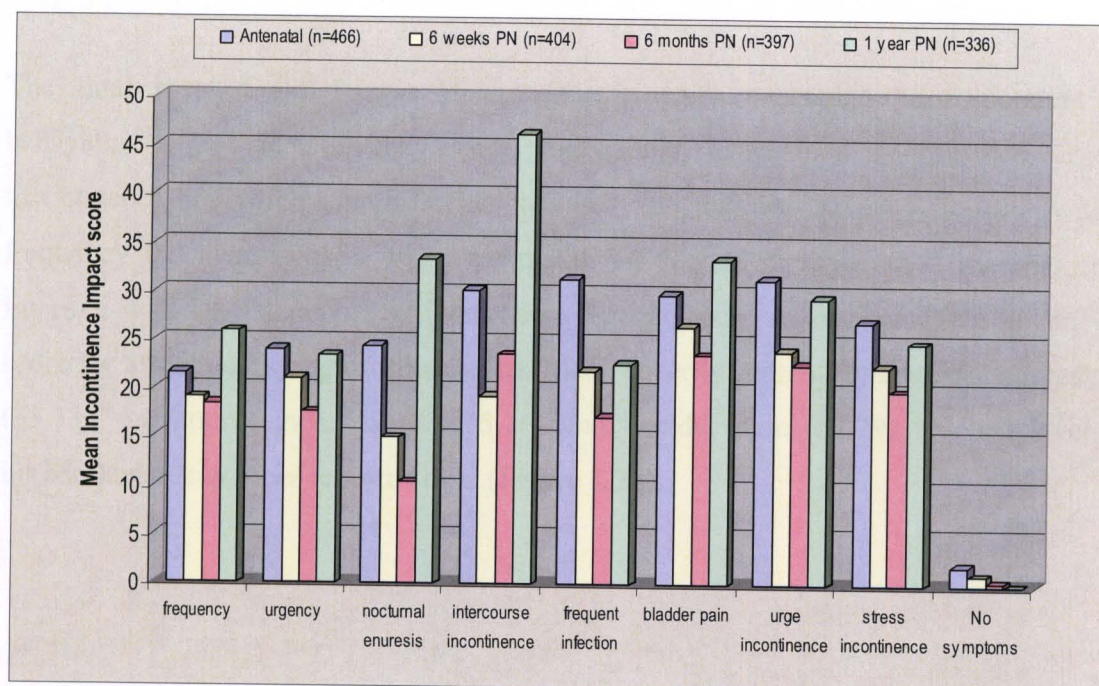


Figure 4.27: Incontinence impact score and UI symptoms



#### **4.12.2.1 Urinary symptoms and incontinence impact score over time**

Antenatally, most respondents indicated an incontinence impact score suggesting little or no impact of bladder problems on life. At 6 weeks postnatal, the impact of all urinary symptoms is less than reported antenatally. This steady decrease in impact of symptoms continued at 6 months, with the exception of intercourse incontinence, which increased but remained below the antenatal impact score. At one year, the incontinence impact score for all urinary symptoms rose to levels higher than at any other time postnatally. Nocturnal enuresis (33.33), bladder pain (33.33) and intercourse incontinence (46.15) having the largest affect whilst stress incontinence (24.81), infection (22.63) and urgency (23.44) were having the least impact.

The mean incontinence impact score for each urinary symptom was compared using Friedman's ANOVA. There was a statistically significant difference in incontinence impact score according to urinary symptom ( $X^2 = 13.98$ , 7df,  $p = .05$ ). Pain, intercourse incontinence, nocturnal enuresis and urge incontinence had the greatest overall detrimental effect on life. Urgency and frequency had the least effect.

#### **4.12.3 SEVERITY**

The final part of the King's Health Questionnaire measures the respondent's behaviour to provide a severity score. Antenatally, intercourse incontinence, urge incontinence and frequent infection reached the highest severity scores, with frequency the lowest. At 6 weeks postnatal, all scores improve. At 6 months, all improve with the exception of intercourse incontinence. At one year, the severity score for all urinary symptoms increased. Mean severity scores for nocturnal enuresis (33.33), intercourse incontinence (35.26) and bladder pain (32.29) reached levels higher than at any other reported time (Figure 4.28).

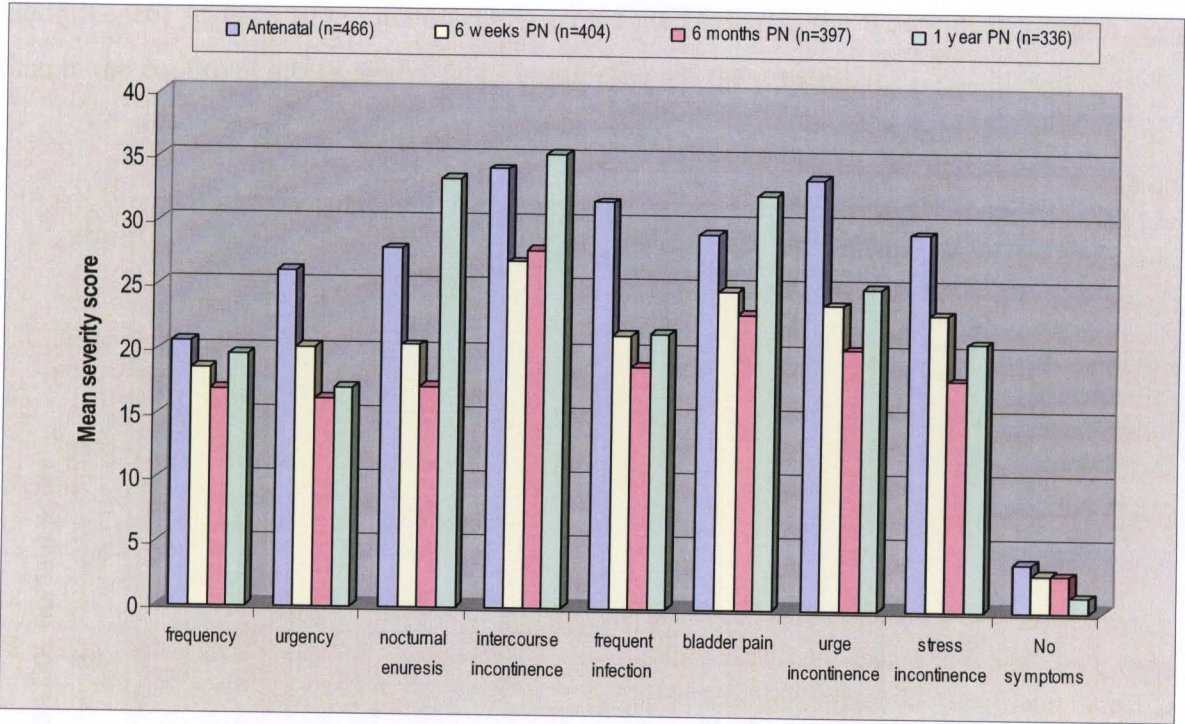


Figure 4.28: Incontinence severity score and UI symptoms

The mean incontinence impact score for each urinary symptom was compared using Friedman’s ANOVA. There was a statistically significant difference in incontinence severity score according to urinary symptoms ( $X^2=24.417$ , 7df,  $p=.001$ ). Pain, intercourse incontinence, and urge incontinence had the greatest overall mean severity score. Urgency and frequency had the least effect.

4.12.4 QUALITY OF LIFE DOMAIN SCORES

Respondents were asked specifically about how their bladder problem was impacting upon several quality of life domains. Data was collected in relation to six QoL domains:

- Role limitations
- Physical
- Social
- Personal relationship
- Emotion
- Sleep/energy

High QoL domain scores indicate a greater impact. Low scores suggest less impact. Figure 4.29 illustrates the cumulative impact on QoL domains of urinary and anal



incontinence. At each time interval, QoL scores are higher in the incontinent groups than in the continent group, with energy being effected the greatest.

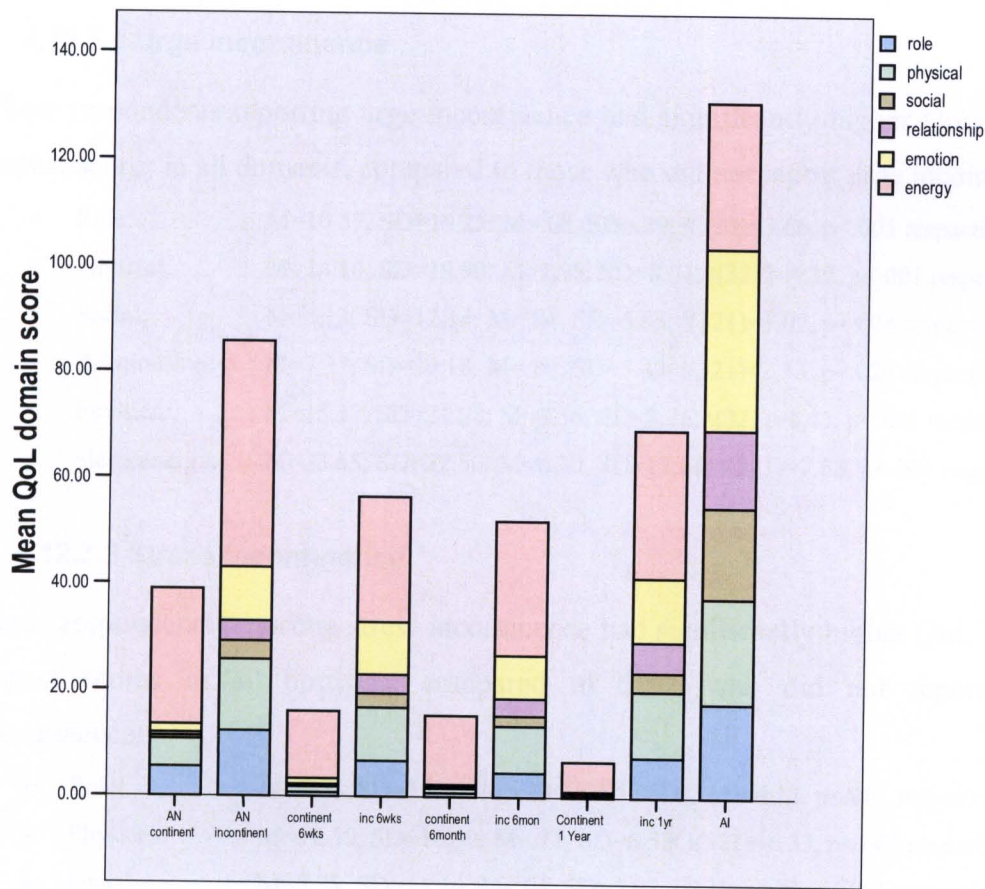


Figure 4.29: Mean quality of life domain scores for continent and incontinent groups at each time interval

Table 4.17 summarises the mean QoL domain scores for urge and stress incontinence and gives comparison scores from continent controls.

		Role	Physical	Social	Relationship	Emotion	Sleep/energy
Urge Incontinence	Antenatal	15.75	17.6	5.15	4.95	13.79	46.91
	6 weeks PN	17.66	19.37	10.28	15.64	19.13	19.22
	6 months PN	5.35	9.67	2.33	3.49	9.05	28.60
	1 year PN	10.57	14.10	5.13	7.37	15.17	33.65
Stress incontinence	Antenatal	12.53	13.61	3.78	3.97	10.64	42.43
	6 weeks PN	7.16	10.38	2.92	3.95	10.04	23.24
	6 months PN	4.90	9.52	2.15	3.78	8.40	24.51
	1 year PN	7.75	12.79	3.88	6.20	12.66	28.29
Continent controls	Antenatal	5.47	5.28	0.58	0.56	1.50	25.47
	6 weeks PN	0.61	1.17	0.24	0.24	0.99	12.70
	6 months PN	0.61	0.96	0.04	0.27	0.32	13.01
	1 year PN	0.29	0.59	0.09	0.14	0.49	6.02

Table 4.17: Mean QoL domain scores

Data from the results at one year was used for comparison. An independent samples t-test was employed to compare QoL domain scores for those with urge or stress incontinence, compared to continent controls.

4.12.3.1 Urge incontinence

Those respondents reporting urge incontinence had significantly higher QoL domain impact scores in all domains, compared to those who did not report urge incontinence:

- Role: M=10.57, SD=16.25: M=.68, SD=.39; t(321)=3.66, p<.001 respectively.
- Physical: M=14.10, SD=19.90: M=1.98, SD=8.01; t(321)=4.32, p<.001 respectively.
- Social: M=5.13, SD=12.14: M=.04, SD=5.03; t(321)=3.02, p=.004 respectively.
- Relationship: M=7.37, SD=20.18: M=.80, SD=5.42; t(321)=2.33, p=.024 respectively.
- Emotion: M=15.17, SD=21.98: M=1.56, SD=8.76; t(321)=4.41, p<.001 respectively.
- Sleep/energy: M=33.65, SD=22.50: M=8.30, SD=17.61; t(321)=7.68, p<.001 respectively.

4.12.3.3 Stress incontinence

Those respondents reporting stress incontinence had significantly higher QoL domain impact scores in all domains, compared to those who did not report stress incontinence:

- Role: M=7.58, SD=16.16: M=.28, SD=5.98; t(321)=4.12, p<.001 respectively.
- Physical: M=12.50, SD=16.99: M=.71, SD=6.52; t(321)=6.33, p<.001 respectively.
- Social: M=3.78, SD=11.16: M=.04, SD=5.03; t(321)=3.38, p=.001 respectively.
- Relationship: M=6.06, SD=17.72: M=.28, SD=2.16; t(321)=3.04, p=.003 respectively.
- Emotion: M=12.37, SD=20.31: M=.52, SD=5.34; t(321)=5.38, p<.001 respectively.
- Sleep/energy: M=28.22, SD=21.64: M=6.43, SD=16.85; t(321)=8.52, p<.001 respectively.

4.12.3.3 Urinary symptoms

Those respondents who were not incontinent but reporting frequency and/or urgency symptoms, also reported some detriment to their quality of life, particularly the sleep/energy QoL domain.

4.12.3.4 Trend in effect size

Effect size (r) of urge and stress incontinence, on each QoL domain was calculated using the equation  $r = \frac{Z}{\sqrt{N}}$

The results (r) represent Pearson’s correlation coefficient, which is constrained to lie between 0 (no effect) and 1 (a perfect match). Cohen<sup>425;426</sup> presents widely accepted levels for small to large effect:

- $r=.10$  (small effect): the effect explains 1% of the total variance.
- $r=.30$  (medium effect): the effect accounts for 9% of the total variance.
- $r=.50$  (large effect): the effect accounts for 25% of the variance.

The results are summarised in Table 4.18 and illustrated in Figures 4.30 and 4.31.

Urge incontinence had the largest effects on sleep/energy and emotion domains. At one year, the impact of urge incontinence had increased, when compared to the 6 months data, for all domains. The impact of urge incontinence on the social domain increased steadily from 6 weeks postnatal where as in all other domains, the effect decreased slightly at 6 months before rising again by one year.

Stress incontinence had the least effect on the relationship and social domains. Largest effects were on physical and emotion domains. As with urge incontinence, the impact in all domains is higher at one year than at 6 months, with sleep/energy demonstrating the greatest increase.

		Role	Physical	Social	Relationship	Emotion	Sleep/energy
Urge incontinence	Antenatal	0.29	0.30	0.24	0.24	0.38	0.30
	6 weeks PN	0.29	0.39	0.16	0.20	0.40	0.44
	6 months PN	0.24	0.32	0.26	0.15	0.36	0.34
	1 year PN	0.32	0.34	0.33	0.21	0.41	0.43
Stress incontinence	Antenatal	0.25	0.24	0.21	0.22	0.37	0.32
	6 weeks PN	0.32	0.42	0.24	0.24	0.39	0.28
	6 months PN	0.28	0.44	0.26	0.22	0.42	0.29
	1 year PN	0.31	0.47	0.29	0.24	0.44	0.49

Table 4.18: Trends in effect size of stress and urge incontinence on QoL domains.

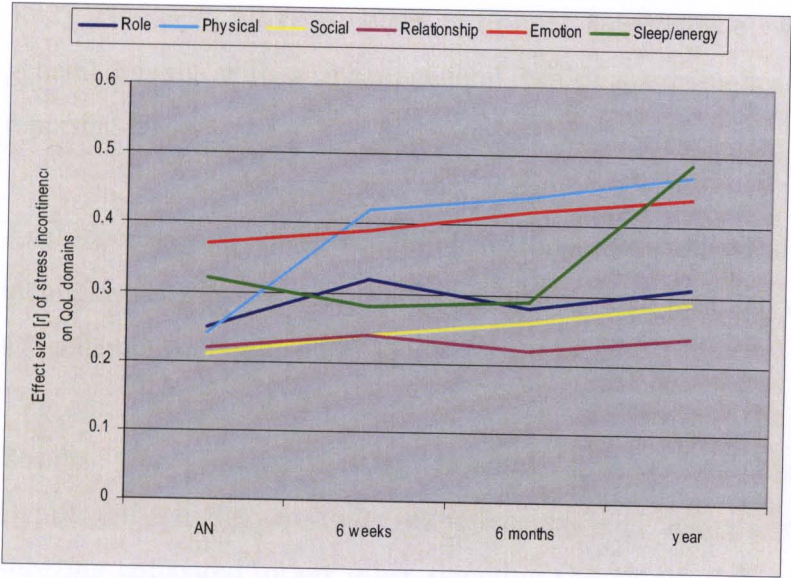


Figure 4.30: Effect size of stress incontinence on QoL domains

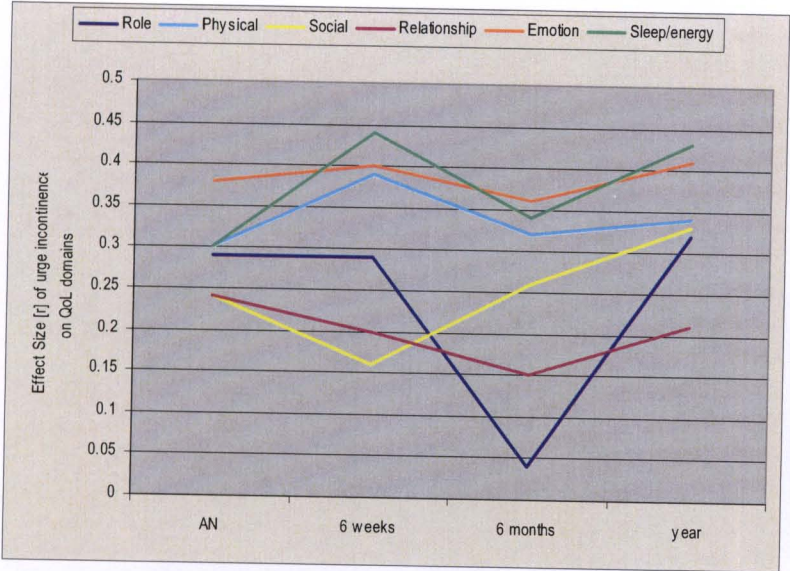


Figure 4.31: Effect size of urge incontinence on QoL domains

4.13 THE IMPACT OF POSTNATAL ANAL INCONTINENCE ON QUALITY OF LIFE

4.13.1 ANAL INCONTINENCE AND GENERAL HEALTH, INCONTINENCE IMPACT AND SEVERITY

Anal incontinence on coughing or when walking, and also an inability to keep clean due to leakage, had the highest mean general health scores, all scoring 50 (Figure



4.32). However, all respondents with anal incontinence reported less than optimal general health, with a mean general health score higher than those respondents reporting UI.

Anal incontinence during coughing/sneezing and walking, also had the highest mean incontinence impact scores. This suggests that their problem was affecting their life to a “moderate” or “quite a bit” level.

Results were analysed using Friedman’s ANOVA. The severity index was significantly higher in those experiencing anal incontinence during walking or sneezing compared to any other symptom ( $X^2=44.95$ , 7df,  $p<.005$ ). There was no significant difference in mean scores when the loss of faeces or wind was compared.

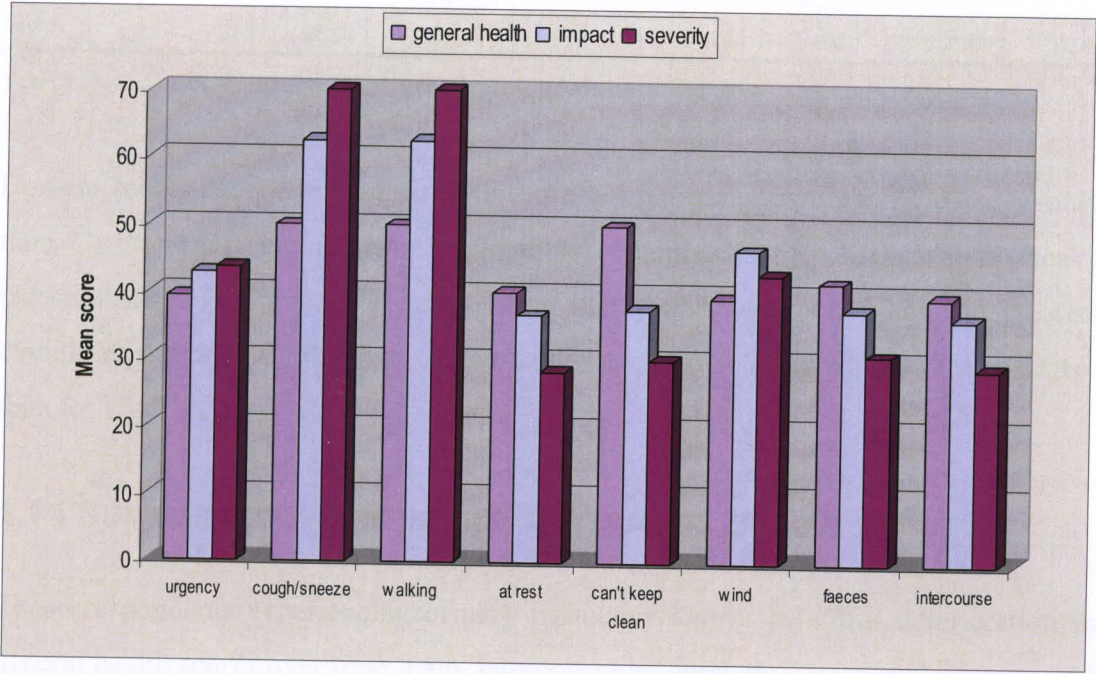


Figure 4.32: Mean scores for general health, incontinence impact and severity for those reporting anal incontinence

14.3.2 QUALITY OF LIFE DOMAINS

Anal incontinence affected all QoL domains. The greatest impact was on emotion and general health. The least impact was on personal relationships. Table 4.19 presents a summary of the QoL domain scores for those reporting anal incontinence.

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
health	31	41.35	24.436	0	75	25.00	50.00	56.25
role	31	17.74	18.757	0	50	.00	12.50	37.50
physical	31	19.76	21.836	0	75	.00	25.00	37.50
social	31	17.20	20.964	0	75	.00	8.33	33.33
relationship	31	14.58	19.990	0	75	.00	.00	25.00
emotion	31	34.1377	28.97591	.00	100.00	16.6600	25.0000	58.3300
energy	31	27.50	22.776	0	75	.00	25.00	50.00

Table 4.19: QoL domain scores for those reporting anal incontinence

Domain scores cannot be compared to those not reporting anal incontinence, as only those with anal incontinence symptoms completed the Manchester Health Questionnaire. Figure 4.29 clearly shows that anal incontinence has the greatest overall impact on QoL domains. All domains appear to be effected to a greater degree than for UI.

4.14 SUMMARY OF INCONTINENCE AND QUALITY OF LIFE

Those respondents experiencing urinary frequency appear to suffer deterioration in general health scores over time. Pain, intercourse incontinence, nocturnal enuresis and infection had the greatest impact on general health scores.

Those respondents with urinary symptoms persisting at one year reported higher incontinence severity scores. Pain, intercourse incontinence and urge incontinence had the highest severity scores.

If urinary symptoms still persist at one year, the impact of those symptoms appears to be greater, particularly for those experiencing pain, intercourse incontinence or urge incontinence.

Urge incontinence effected emotion and sleep/energy domains the most. The effect on all domains was worse at one year than at 6 months.

Stress incontinence effected the relationship domain the least and physical and emotion the most. All domains scores were worse at one year than at 6 months with the increase in sleep/energy score the most evident.

There was no difference between groups reporting anal incontinence and those reporting faecal incontinence. All had higher general health, impact and severity scores than those reporting UI. Anal incontinence on coughing/sneezing or on walking had the worst impact on general health, higher severity scores and greatest impact.

All QoL domain scores for those reporting anal incontinence were worse than for those suffering UI with the emotion domain the greatest effected and relationship affected the least. QoL domain scores for those who were continent or reporting UI at each time interval, together with those reporting anal incontinence are presented in Figure 4.28.

#### 4.14.5 BEHAVIOUR

Most respondents who reported UI or anal incontinence also reported a change in behaviour. This included the wearing of protective pads to keep dry most or all of the time, often being careful how much fluid they drank or food they ate, often worrying that they may smell and sometimes needing to change underclothes due to soiling. Those with anal incontinence reported often feeling embarrassed.

#### 4.15 NORMATIVE SEXUALITY DATA

Baseline sexuality data from the general population was not available. A separate sample of 30 nulliparous, continent women of childbearing age were recruited to complete the Sexuality Scale in order to provide baseline data.

Sexual esteem scores ranged from -20 to +8 with a mean of -5.83 and a standard deviation of 7.052. Skewness (-0.232) and Kurtosis (-0.343) were both negative indicating a relatively flat distribution, clustered towards the higher range of scores. The Kolmogorov-Smirnov statistic is .124 and at the lower bound of true significance (.20) indicating normality.

Sexual depression scores ranged from -7 to +14 with a mean of 3.27 and a standard deviation of 5.771. Skewness (0.065) and Kurtosis (-0.886) indicating a relatively flat distribution, clustered towards the lower range of scores. The Kolmogorov-Smirnov statistic is 0.081 and at the lower bound of true significance (.20) indicating normality.

Sexual preoccupation scores ranged from -15 to +13 with a mean of 0.63 and a standard deviation of 7.627. Skewness (-0.578) and Kurtosis (-0.560) were both negative indicating a relatively flat distribution, clustered towards the higher range of scores. The Kolmogorov-Smirnov statistic is 0.189 and is not significant, indicating a violation of the assumption of normality.



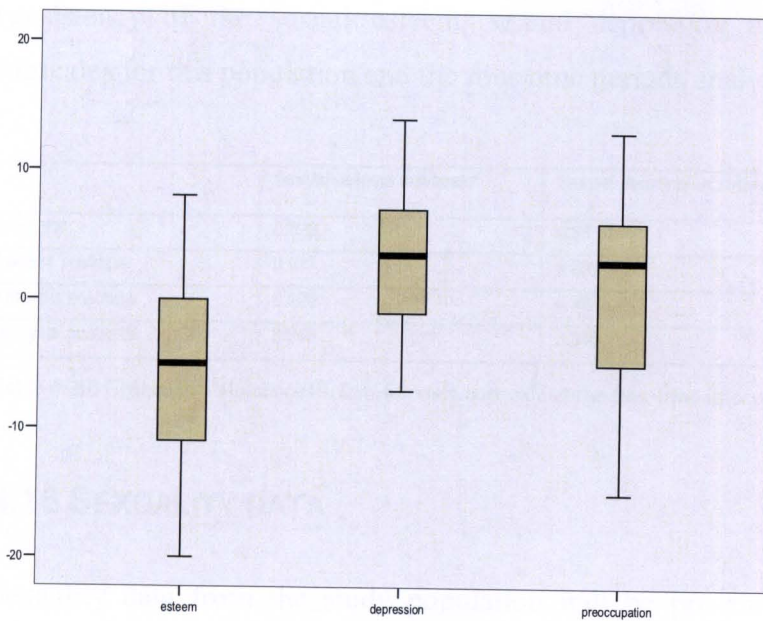


Figure 4.33: Box plot of the distribution of normative data scores for sexual esteem, sexual depression and sexual preoccupation.

#### 4.15.1. RELATIONSHIP BETWEEN SEXUALITY SCALES

The relationship between sexual esteem, sexual depression and sexual preoccupation was investigated using Spearman's Rank Order Correlation Coefficient and Pearson product-moment correlation coefficient. There was a strong positive correlation between the two variables sexual esteem and sexual preoccupation ( $r = -.817$  to  $-.860$ ,  $n = 30$ ,  $p < .0005$ ), with high levels of preoccupation being associated with high esteem. There was also a strong negative correlation between sexual esteem and sexual depression ( $r = -.798$ ,  $n = 30$ ,  $p < .0005$ ) with high levels of sexual esteem correlating with low levels of sexual depression. There was also a strong negative correlation between depression and preoccupation ( $r = -.752$  to  $-.816$ ,  $n = 30$ ,  $p < .0005$ ) indicating high levels of sexual depression being associated with low levels of sexual preoccupation.

#### 4.15.2 RELIABILITY OF THE SEXUALITY SCALE FOR THIS STUDY POPULATION

Reliability of the sexuality scales for this particular population was assessed. The results are summarised in Table 4.20 and demonstrate good reliability and internal

consistency of the sexual esteem, sexual depression and sexual preoccupation subscales for this population and the four time periods analysed.

	Sexual esteem subscale	Sexual depression subscale	Sexual preoccupation subscale
Antenatal	0.899	0.88	0.793
6 weeks postnatal	0.917	0.898	0.803
6 months postnatal	0.929	0.903	0.929
One year postnatal	0.940	0.940	0.849

Table 4.20: Cronbach's alpha coefficient for each subscale at the four time intervals analysed

4.16 SEXUALITY DATA

Sexuality data from the study population will be presented for each time period (antenatal, 6 weeks postnatal, 6 months postnatal and one year postnatal). Sexuality scores for continent and incontinent respondents will be compared and explored. Differences between results for the continent and incontinent group were assessed using ANOVA and Mann-Whitney U test. Firstly the mean scores for each time interval were examined using Pearson correlation, overall there was a strong negative correlation between SE and SP ( $r=-.919$ ,  $p<.005$ ) and between SE and SD ( $r=-.956$ ,  $p<.005$ ) and a strong positive correlation between SD and SP ( $r=.861$ ,  $p<.005$ ) as illustrated in Figure 4.34 below.

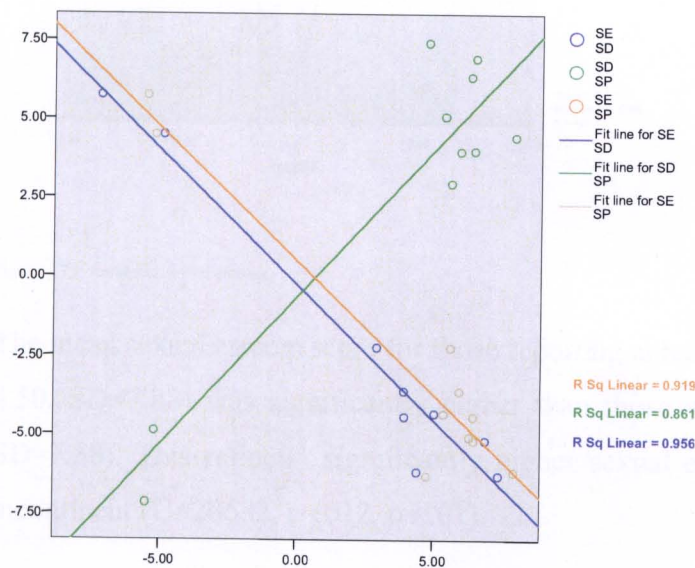


Figure 4.34: Correlation between mean scores

#### 4.16.1 ANTENATAL SEXUALITY DATA

In total, 466 women completed the antenatal questionnaire, of which 445 (95.5%) returned completed sexuality questionnaires.

##### 4.16.1.1 Sexual esteem

Sexual esteem scores ranged from -20 to +20, with a mean of -5.4 and a standard deviation of 8.25. Skewness (0.456) suggests a degree of clustering towards the lower values. Kurtosis (-0.114) verifying the rather flat distribution of scores. Figure 4.35 illustrates antenatal sexual esteem scores. The Kolmogorov-Smirnov statistic is 0.86 and not significant indicating a violation of the assumption of normality. In contrast to the non-pregnant population above, sexual esteem appears to be lower overall in the antenatal period.

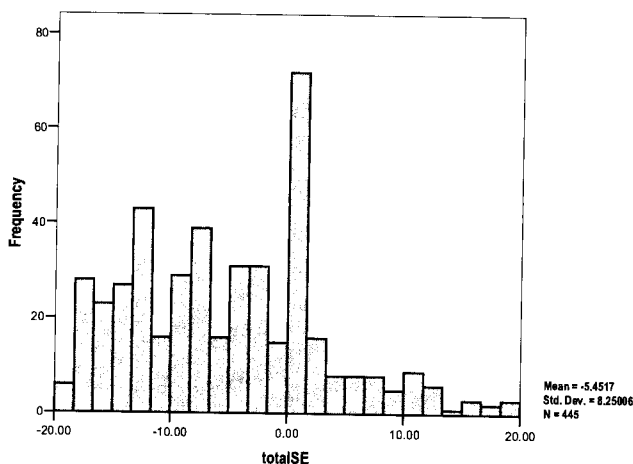


Figure 4.35: Antenatal sexual esteem

The mean sexual esteem score for those reporting antenatal urinary incontinence ( $M=-4.50$ ,  $SD=7.88$ ) was significantly higher than those who were continent ( $M=-6.35$ ,  $SD=7.88$ ). This reflects significantly higher sexual esteem in the group who were incontinent ( $U=20682$ ,  $r=.012$ ,  $p=.01$ ).



#### 4.16.1.2 Sexual depression

Sexual depression scores ranged from -16 to +16 with a mean score of 7.37 and a standard deviation of 7.00. Skewness (-0.567) and Kurtosis (-0.580) confirm a flattened distribution, clustered at the higher end of the range (Figure 4.36). The Kolmogorov-Smirnov statistic is 0.94 and not significant indicating a violation of the assumption of normality. In contrast to the non-pregnant population above, sexual depression appears to be higher overall in the antenatal period.

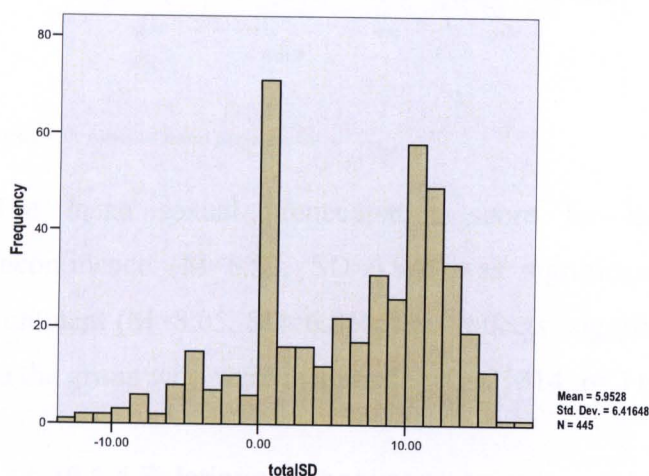


Figure 4.36: Antenatal sexual depression

No significant difference was found between sexual depression scores when continent ( $M=4.42$ ,  $SD=6.01$ ) and incontinent groups ( $M=3.92$ ,  $SD=6.29$ ) were compared ( $U=22943$ ,  $r=.04$ ,  $p=.37$ ).

#### 4.16.1.3 Sexual preoccupation

Sexual preoccupation scores ranged from -16 to +20 with a mean of 4.27 and a standard deviation of 6.67. Skewness (0.071) and Kurtosis (0.102) confirm clustering towards the lower range of values with a central peak (Figure 4.37). As in the non-pregnant population, the Kolmogorov-Smirnov statistic is 0.132 and not significant indicating a violation of the assumption of normality. Sexual preoccupation scores amongst the continent and incontinent groups were considerably higher than those reported in the non-pregnant group.

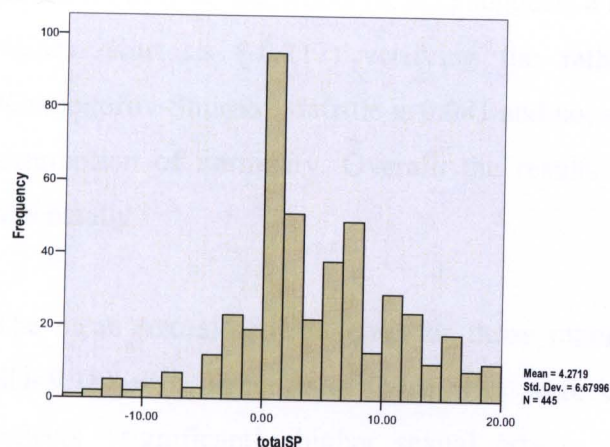


Figure 4.37: Antenatal sexual preoccupation

The mean sexual preoccupation score for those reporting antenatal urinary incontinence ( $M=6.57$ ,  $SD=6.94$ ) was significantly lower than those who were continent ( $M=8.05$ ,  $SD=6.86$ ). This reflects significantly lower sexual preoccupation in the group who were incontinent ( $U=21314$ ,  $r=.11$ ,  $p=.01$ ).

4.16.1.4 Relationship between sexuality scales in the antenatal period

The relationship between sexual esteem, sexual depression and sexual preoccupation was investigated using Spearman’s Rank order correlation coefficient. There was a strong negative correlation between the two variables sexual esteem and sexual preoccupation ( $r=-.673$ ,  $n=448$ ,  $p<.0005$ ), with high levels of preoccupation being associated with low esteem. No other significant association between the variables was found at this time. This finding applied to both continent and incontinent groups.

4.16.2 SIX WEEKS POSTNATAL SEXUALITY DATA FROM STUDY POPULATION

In Total, 404 women completed the 6 week postnatal questionnaire, of which complete sexuality data is available for 382 (94.5%).

#### **4.16.2.1 Sexual esteem**

Sexual esteem scores ranged from -20 to +20, with a mean of -5.6 and a standard deviation of 8.92. Skewness (0.511) suggests a degree of clustering towards the lower values. Kurtosis (-0.217) verifying the rather flat distribution of scores. The Kolmogorov-Smirnov statistic is 0.081 and not significant indicating a violation of the assumption of normality. Overall, the results were very similar to those reported antenatally.

The mean sexual esteem score for those reporting urinary incontinence ( $M=-4.34$ ,  $SD=9.18$ ) was higher than those who were continent ( $M=-6.32$ ,  $SD=7.88$ ). This reflects significantly higher sexual esteem in the group who were incontinent ( $U=13743$ ,  $r=.12$ ,  $p=.03$ ).

#### **4.16.2.2 Sexual depression**

Sexual depression scores ranged from -16 to +16 with a mean score of 6.63 and a standard deviation of 7.59. Skewness (-0.478) and Kurtosis (-0.521) confirm a flattened distribution, clustered at the higher end of the range. The Kolmogorov-Smirnov statistic is 0.127 and not significant indicating a violation of the assumption of normality. Again, overall the results are very similar to those in the antenatal period.

The continent group had significantly higher mean sexual depression ( $M=7.39$ ,  $SD=7.74$ ) when compared to the incontinent group ( $M=5.06$ ,  $SD=6.97$ ,  $U=12607$ ,  $r=.16$ ,  $p=.001$ ).

#### **4.16.2.3 Sexual preoccupation**

Sexual preoccupation scores ranged from -14 to +20 with a mean of 5.02 and a standard deviation of 6.86. Skewness (0.168) and Kurtosis (-0.208) suggest a flat distribution, clustered towards the lower values. The Kolmogorov-Smirnov statistic is 0.087 and not significant indicating a violation of the assumption of normality. Distribution of scores is flatter than those reported antenatally.

There was no statistical significance between mean SP scores for the continent and incontinent groups ( $U=15144$ ,  $r=.02$ ,  $p=.63$ )

#### **4.16.2.4 Relationship between sexuality scales six weeks postnatal**

The relationship between sexual esteem, sexual depression and sexual preoccupation was investigated using Spearman's Rank order correlation coefficient. There was a mild positive correlation between the two variables sexual esteem and sexual preoccupation ( $r=.171$ ,  $n=383$ ,  $p<.001$ ). There was also a strong negative correlation between sexual esteem and sexual depression ( $r=-.766$ ,  $n=385$ ,  $p<.0005$ ) with high levels of sexual esteem correlating with low levels of sexual depression. This finding applied to both the continent and incontinent group.

#### **4.16.3 SIX MONTHS POSTNATAL SEXUALITY DATA FROM STUDY POPULATION**

A total of 397 women completed the questionnaires at 6 months postnatal. Of these, 370 (93%) returned a completed sexuality questionnaire.

##### **4.16.3.1 Six months postnatal sexual esteem**

Sexual esteem scores ranged from -20 to +20, with a mean of 5.29 and a standard deviation of 9.35. Skewness (-0.525) suggests a degree of clustering towards the upper values. Kurtosis (-0.257) verifying the rather flat distribution of scores (Figure 4.38). The Kolmogorov-Smirnov statistic is 0.087 and not significant indicating a violation of the assumption of normality. Overall, the results suggest an overall increase in sexual esteem and are more comparable to the normative scores obtained from a non-pregnant population.



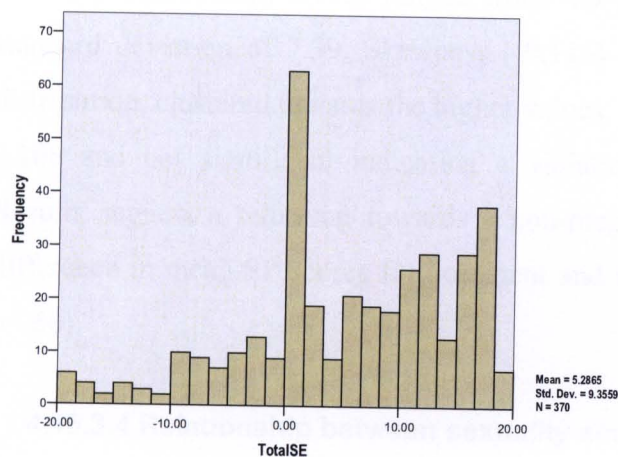


Figure 4.38: Sexual esteem at 6 months postnatal

The UI group reported lower levels of SE ( $M=4.49$ ,  $SD=9.23$ ) than the continent group ( $M=5.73$ ,  $SD=9.43$ ) although this failed to reach statistical significance ( $U=13439$ ,  $r=.07$ ,  $p=.16$ )

4.16.3.2 Six months postnatal sexual depression

Sexual depression scores ranged from -16 to +16 with a mean score of -6.36 and a standard deviation of 7.7. Skewness (0.502) and Kurtosis (-0.550) confirm a flattened distribution, clustered at the lower end of the range. The Kolmogorov-Smirnov statistic is 0.106 indicating a violation of the assumption of normality. Overall, the results suggest an overall decrease in sexual depression and are more comparable to the normative scores obtained from a non-pregnant population.

All SD scores were very low compared to non-pregnant data and antenatal data. The incontinent group reported significantly higher levels of SD Incontinent ( $M=-4.89$ ,  $SD=7.47$ ) compared to the continent group Continent ( $M=-7.17$ ,  $SD=7.73$ ,  $U=11955$ ,  $r=.16$ ,  $p=.003$ )



#### **4.16.3.3 Six months postnatal sexual preoccupation**

Sexual preoccupation scores ranged from -20 to +14 with a mean of -5.35 and a standard deviation of 7.39. Skewness (-0.116) and Kurtosis (-0.585) suggest a flat distribution, clustered towards the higher values. The Kolmogorov-Smirnov statistic is 0.106 and not significant indicating a violation of the assumption of normality. Results suggest a returning towards a non-pregnant state. There was no statistical difference in mean SP scores for continent and incontinent groups ( $U=14098$ ,  $r=.02$ ,  $p=.66$ )

#### **4.16.3.4 Relationship between sexuality scales six months postnatal**

The relationship between sexual esteem, sexual depression and sexual preoccupation was investigated using Spearman's Rank order correlation coefficient. There was a mild negative correlation between the two variables sexual esteem and sexual preoccupation ( $r=-.356$ ,  $n=373$ ,  $p<.0005$ ). There was also a strong negative correlation between sexual esteem and sexual depression ( $r=-.775$ ,  $n=373$ ,  $p<.0005$ ) with high levels of sexual esteem correlating with low levels of sexual depression.

### **4.16.4 ONE YEAR POSTNATAL SEXUALITY DATA FROM STUDY POPULATION**

In total, 336 completed questionnaires were returned at one year postnatal. 317 (94%) included a complete sexuality questionnaire.

#### **4.16.4.1 One year postnatal sexual esteem**

Sexual esteem scores ranged from -20 to +20 with a mean of -4.86 and a standard deviation of 9.92. Skewness (0.521) suggests a degree of clustering towards the lower values. Kurtosis (-0.477) verifying the rather flat distribution of scores (Figure 4.39). The Kolmogorov-Smirnov statistic is 0.089 and not significant indicating a violation of the assumption of normality. Overall, the results suggest a decrease in sexual esteem, compared to the 6 month postnatal results. No statistical significance was found between SE scores for continent and incontinent groups ( $U=8736$ ,  $r=.08$ ,  $p=.14$ ).

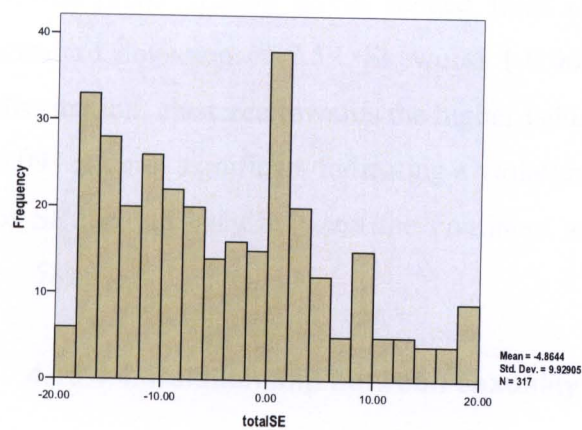


Figure 4.39: Sexual esteem at one year postnatal

4.16.4.2 One year postnatal sexual depression

Sexual depression scores ranged from -16 to +16 with a mean score of 6.1 and a standard deviation of 8.22. Skewness (-0.517) and Kurtosis (-0.753) confirm a flattened distribution, clustered at the upper end of the range. The Kolmogorov-Smirnov statistic is 0.137 and not significant indicating a violation of the assumption of normality. Overall, the results suggest an overall increase in sexual depression compared to the 6 month postnatal results. The continent group had higher levels of sexual depression (M=6.91, SD=8.29) than the incontinent group (M= 3.94, SD=8.15, U=7733, r=.17, p=.002).

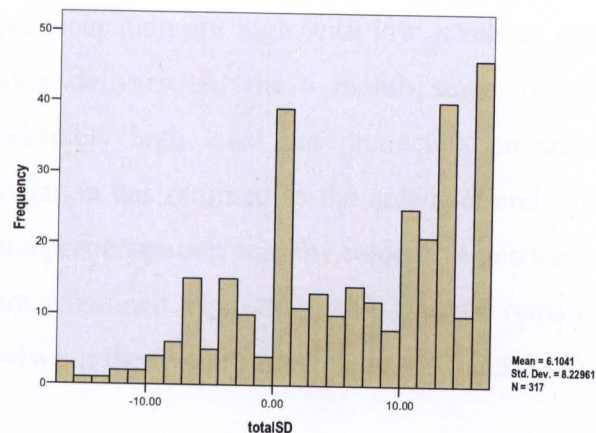


Figure 4.40: Sexual depression at one year postnatal

#### **4.16.4.3 One year postnatal sexual preoccupation**

Sexual preoccupation scores ranged from -15 to +20 with a mean of 6.21 and a standard deviation of 7.59. Skewness (-0.067) and Kurtosis (-0.540) suggest a flat distribution, clustered towards the higher values. The Kolmogorov-Smirnov statistic is 0.099 and not significant indicating a violation of the assumption of normality. Levels of SP did not vary between the continent and incontinent groups ( $U=9363$ ,  $r=.03$ ,  $p=.58$ ).

#### **4.16.4.4. Relationship between sexuality scales one year postnatal**

The relationship between sexual esteem, sexual depression and sexual preoccupation was investigated using Spearman's Rank order correlation coefficient. There was a moderate negative correlation between the two variables sexual esteem and sexual preoccupation ( $r=-.42$ ,  $n=326$ ,  $p<.0005$ ), with high levels of preoccupation being associated with low esteem. There was also a strong negative correlation between sexual esteem and sexual depression ( $r=-.767$ ,  $n=326$ ,  $p<.0005$ ) with high levels of sexual esteem correlating with low levels of sexual depression. There was also a mild negative correlation between depression and preoccupation ( $r=-.269$ ,  $n=326$ ,  $p<.0005$ ) indicating high levels of sexual depression being associated with low levels of sexual preoccupation.

### **4.17 TRENDS IN MEAN SEXUALITY SCORES**

The mean scores for sexual esteem, sexual depression and sexual preoccupation over the four time periods are illustrated in Figure 4.41. Antenatally, both depression and preoccupation are high with low levels of esteem. There is little change at 6 weeks after delivery. At the 6 month stage, the situation is reversed with esteem at a relatively high level but preoccupation and depression falling. By one year, the situation has returned to the antenatal and early postnatal pattern of high depression and preoccupation and low esteem. When the continent groups and incontinent groups are examined separately, this pattern remains, with little difference demonstrated between the two groups (Figure 4.42 and 4.43).

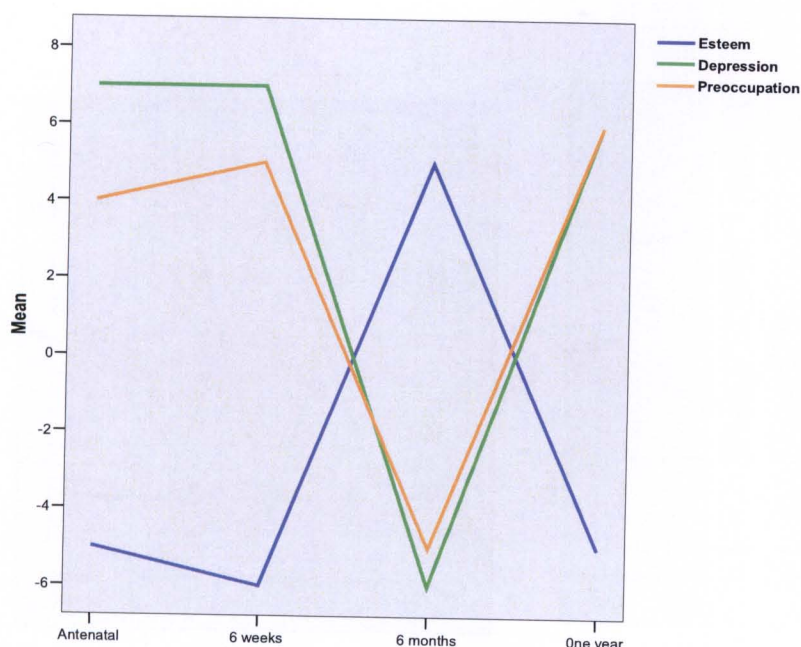


Figure 4.41: Trends in mean sexual esteem, sexual depression and sexual preoccupation over the four time periods analysed – all replies

Whereas in the normative data, SP correlated positively with SE and negatively with SD, the results from this study population show a reverse of this. SE and SP correlated negatively with each other ( $r = -.92$ ) whilst SD and SP correlated positively ( $r = .86$ ). Snell<sup>21</sup> has previously demonstrated a gender difference in SP. He found that for women sexual preoccupation tended to be associated with high levels of sexual esteem, whereas for men, SP was associated with high levels of depression. These findings suggest that during pregnancy and the postnatal period, even at one year postnatally, women resemble men in that sexual preoccupation tends to correlate with sexual depression. This finding is independent to continent status.

#### 4.18 RELATIONSHIPS BETWEEN INCONTINENCE AND FEMALE SEXUAL ESTEEM, SEXUAL PREOCCUPATION AND SEXUAL DEPRESSION

The mean sexuality scores for the continence and incontinence groups are presented in Figures 4.32 and 4.33. The trends for sexual esteem, sexual depression and sexual preoccupation were the same in both groups.



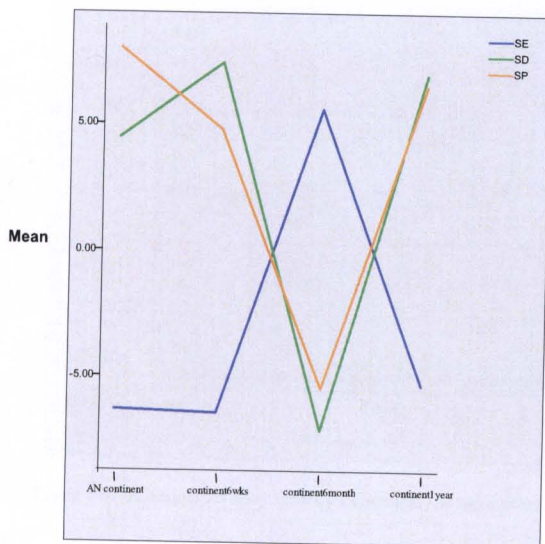


Figure 4.42: Continent group - trends of sexuality scores

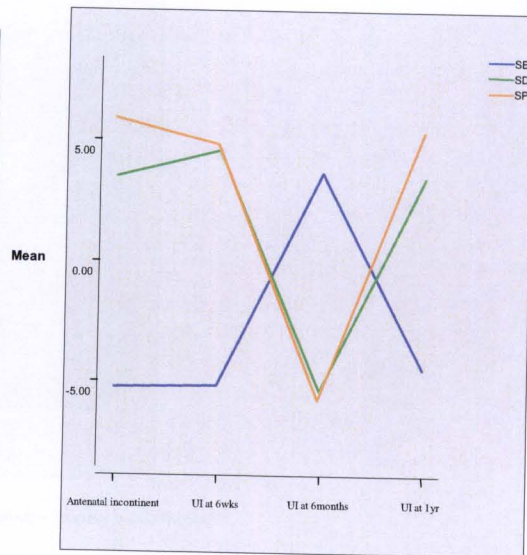


Figure 4.43: Incontinent group - trends of sexuality scores

#### 4.18.1 SEXUALITY SCORES FOR CONTINENT AND INCONTINENT GROUPS

Figures 4.44 to 4.47 graphically illustrate the mean scores for sexual esteem, sexual depression and sexual preoccupation for each period, comparing the continent and incontinent groups. Antenatally, 6 weeks and a year postnatal, sexual esteem is low with depression and preoccupation high. The continent group seems to have lower esteem and higher depression than the incontinent group. Depression correlated positively with preoccupation. At 6 months, SE is high with SD and SP low. The continent group have higher sexual esteem than the incontinent group, with less sexual depression.

Antenatally, mean SE was significantly lower in the continent group ( $U=20,682$ ,  $p=.01$ ,  $r=.12$ ) whilst mean SP was significantly higher ( $U=21,314$ ,  $p=.01$ ,  $r=.11$ ). The difference in SD was not statistically significant.

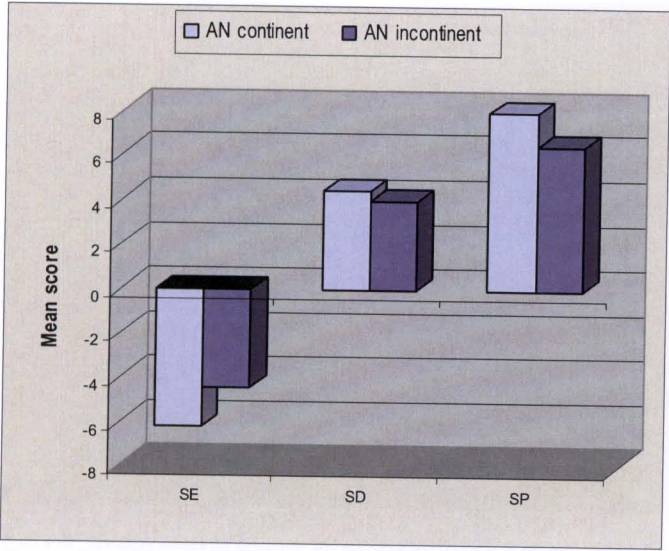


Figure 4.44: Antenatal sexuality scores for continent and incontinent groups (urinary incontinence)

At 6 weeks postnatal, SE was significantly lower in the continent group ( $U=13,743$ ,  $p=.03$ ,  $r=.11$ ) whilst SD was significantly higher ( $U= 12,607$ ,  $p=.001$ ,  $r=.16$ ). The difference between SP scores was not significant.

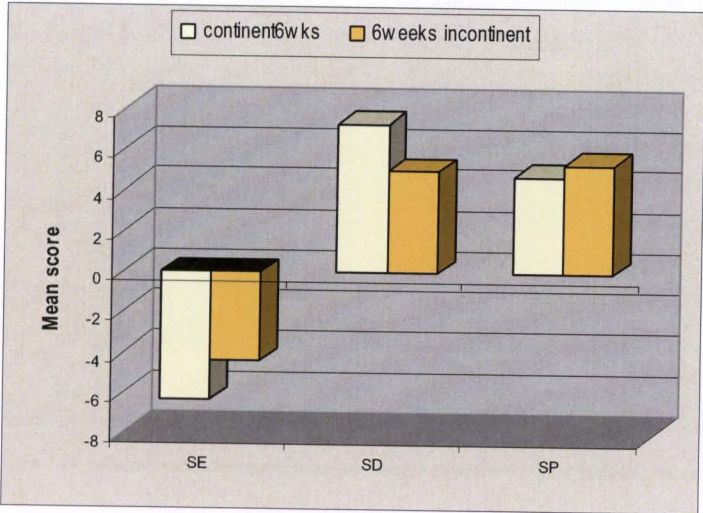


Figure 4.45: Sexuality scores for continent and incontinent groups at 6 weeks postnatal (urinary incontinence)

At 6 months postnatal, only the SD scores were significantly different between the continent and incontinent groups, with the continent group having less SD than the incontinent group ( $U=11,955$ ,  $p=.003$ ,  $r=.16$ ), although compared to normative data, all respondents showed low levels of depression and high levels of esteem.



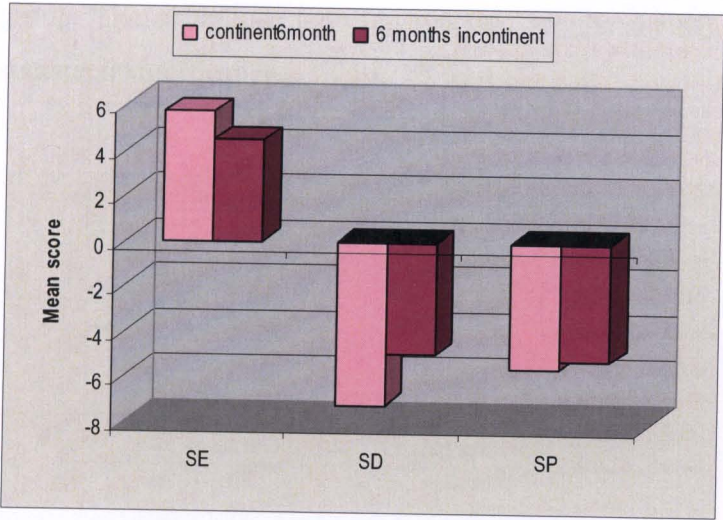


Figure 4.46: Sexuality scores for continent and incontinent groups at 6 months postnatal (urinary incontinence)

At one year postnatal, only SD scores were significantly different between the two groups, with the continent group having higher levels of SD than the incontinent group ( $U=7,733$ ,  $p=.002$ ,  $r=.17$ )

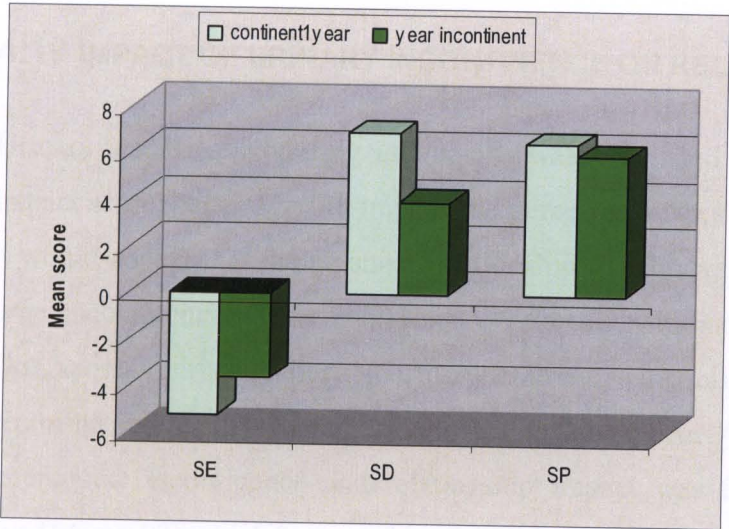


Figure 4.47: Sexuality scores for continent and incontinent groups at one-year postnatal (urinary incontinence)

Figure 4.48 shows the same scores for the anal incontinence and anal continent groups. The results mirror those found for UI at one year, with the continent group having more depression and less esteem than the incontinent group.

The one year anal incontinence sexuality scores for the two groups (anal incontinence or anal continence) were significantly different for SD ( $U=3,199$ ,  $p=.05$ ,  $r=.15$ ) with the group reporting anal incontinence being less sexually depressed than the continent

group. The difference between the two groups for SE and SP scores did not reach statistical significance.

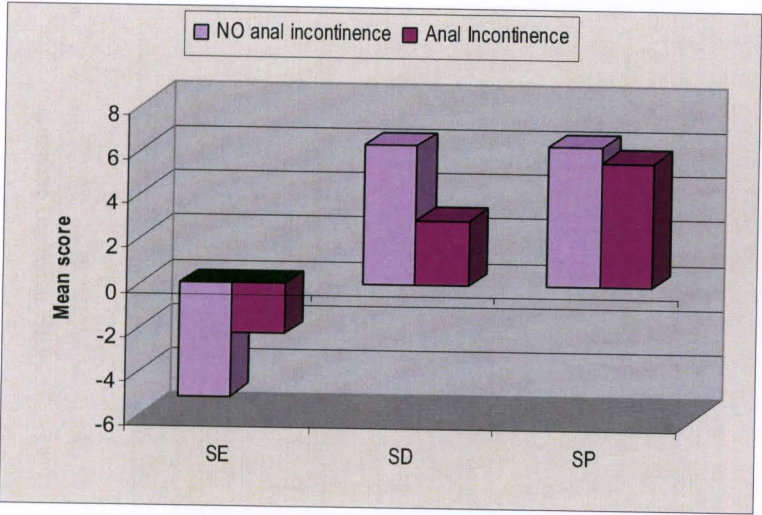


Figure 4.48: Sexuality scores for continent and incontinent groups at one-year postnatal (anal incontinence)

4.19 IMPACT OF URINARY INCONTINENCE ON RELATIONSHIPS

Urinary incontinence during intercourse was associated with increased incontinence impact score, general health impact and perceived severity of the condition. However, it would appear that the personal relationship domain was the least effected by either urge incontinence, stress incontinence or anal incontinence. Figure 4.49 illustrates QoL scores for those reporting urinary intercourse incontinence compared to those not reporting intercourse incontinence at each time frame. A small correlation between intercourse incontinence and relationship impact was found at 6 weeks postnatal ( $r=.106, p=.03$ ) which increased by 6 months postnatal ( $r=.333, p<.005$ ) and increased further by one year ( $r=.61, p<.005$ ) suggesting that the impact of intercourse incontinence on personal relationships increases over time. The impact of intercourse incontinence on the relationship domain at one year is higher than that caused by stress incontinence ( $r=.248, p<.005$ ) or urge incontinence ( $r=.269, p<.005$ ). Overall, it can be seen that when compared to the QoL data on Figure 4:29, those reporting intercourse incontinence had a greater cumulative impact on QoL than all who reported UI or anal incontinence.



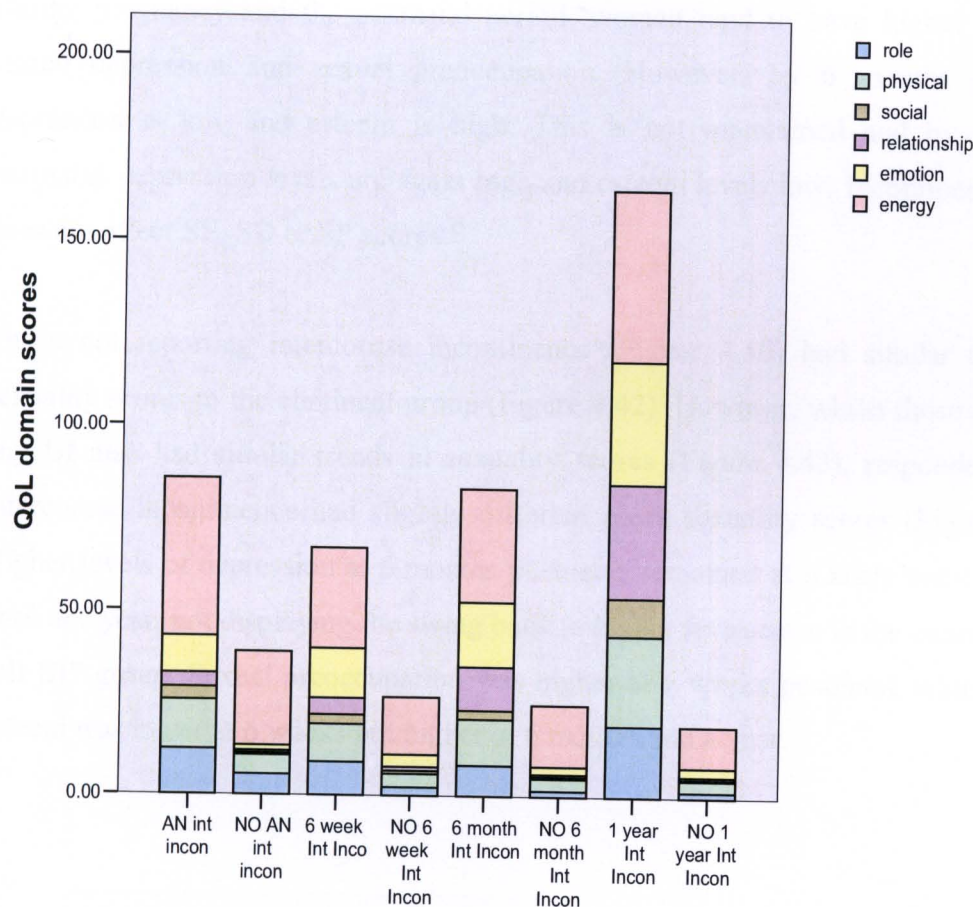


Figure 4.49: QoL domains at each time frame for those reporting urinary intercourse incontinence (Int Incon)

During the antenatal and postnatal period, sexual depression and sexual preoccupation increases, whilst sexual esteem decreases, compared to non-pregnant controls. The exception is at 6 months postnatally, when esteem rises and depression falls. Whilst it can be demonstrated that this occurs somewhere between 6 weeks and 6 months postnatally, it is not clear from this data exactly when this change occurs or how long it lasts. However, by one year, sexuality scores have returned to levels similar to those found at 6 weeks postnatal.

Sexual esteem tends to be statistically significantly higher in the incontinent group antenatally and in the early postnatal period. Sexual depression is statistically significantly lower in the incontinent group antenatally and postnatally with the exception of the 6 months results. However, the actual difference is comparatively small and the clinical significance may be questionable.

During pregnancy and the postnatal period, women tend to have higher levels of sexual depression and sexual preoccupation. However, by 6 months postnatal, depression is low and esteem is high. This is not maintained and by one year postnatal, depression levels are again high and esteem levels low. Incontinence status does not affect SE, SD or SP scores.

Those not reporting intercourse incontinence (Figure 4.50) had similar trends in sexuality scores to the continent group (Figure 4.42). However, whilst those reporting any UI also had similar trends in sexuality scores (Figure 4.43), respondents with intercourse incontinence had slightly different mean sexuality scores (Figure 4.51). Higher levels of depression at 6 months postnatal, remained at a fairly constant level until one year, not displaying the swing back to higher levels seen in the continent and “all UI” group. Sexual preoccupation was higher at 6 weeks postnatal, whilst sexual esteem was lower at 6 weeks but higher at 6 months and a year.

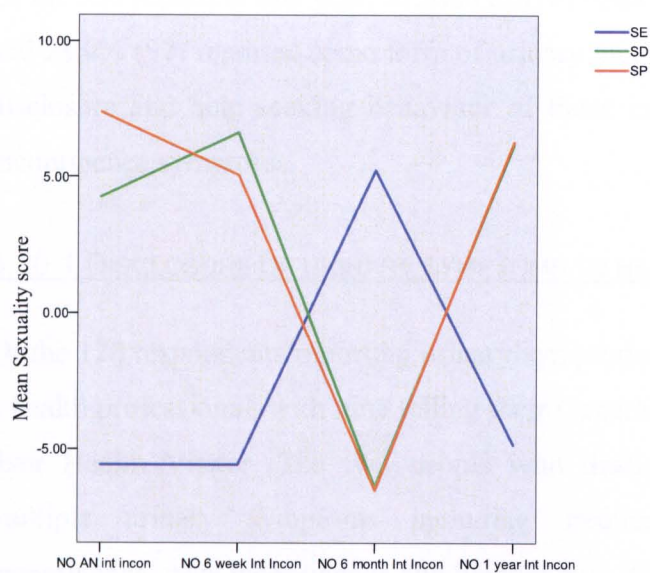


Figure 4.50: Mean sexuality scores for those NOT reporting intercourse incontinence



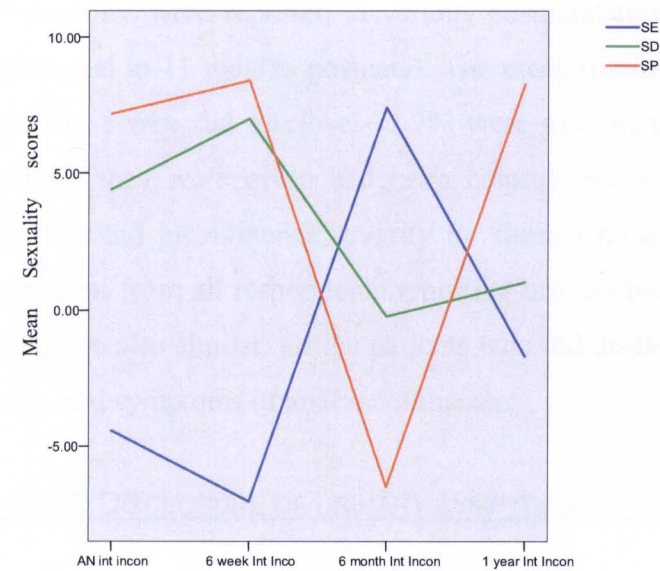


Figure 4.51: Mean sexuality scores for those reporting intercourse incontinence

4.20 DISCUSSION OF CONTINENCE PROBLEMS WITH HEALTH PROFESSIONALS

Of the 336 replies at one year, 37.5% (126) of respondents reported urinary symptoms and 28.9% (97) reported some form of urinary incontinence. This section will explore disclosure and help seeking behaviour of those experiencing either urinary or anal incontinence symptoms.

4.20.1 DISCLOSURE OF URINARY SYMPTOMS TO HEALTH PROFESSIONALS

Of the 126 respondents reporting urinary symptoms, only 11 (8.7%) reported these to a health professional, with nine telling their General Practitioner (GP) and two telling their Health Visitor. The two people who disclosed to their Health Visitor had multiple urinary symptoms including frequency, urgency, nocturia, stress incontinence, urge incontinence and bladder pain. Of the nine people who disclosed to their GP, frequency was reported by 55.5%, nocturia by 44.4%, urgency by 33.3%, urge incontinence by 33.3%, stress incontinence by 88.8%, intercourse incontinence by 22.2%, infection by 22.2% and pain by 44.4%. Stress and urge incontinence was reported by 33.3%.

Symptoms were reported at various postnatal time intervals ranging from 3 weeks postnatal to 11 months postnatal. The mean disclosure time was 24 weeks postnatal. Of those who did disclose, 72.7% were glad they had told someone, believing the advice they were given had been helpful. Scores for general health, incontinence impact and incontinence severity for those who did disclose, were not significantly different from all respondents reporting urinary incontinence. Scores for SE, SD and SP were also similar. Of the patients who did disclose to a health professional, 27.3% also had symptoms of anal incontinence.

#### 4.20.2 DISCLOSURE OF URINARY SYMPTOMS TO PARTNER

Of the 126 respondents reporting urinary symptoms, 10 were no longer with their sexual partner. Of the 116 who were with a partner, 32.8% (38) told their partner about their urinary symptoms. Of the 38 respondents who told their partner, 15.8% (6) also had anal incontinence. Intercourse incontinence was reported by 23.7% (9), stress incontinence by 81.6% (31) and urge incontinence by 50% (19). Almost all (97.4%) stated that their incontinence had not impacted upon their intimate relationship.

#### 4.20.3 DISCLOSURE OF ANAL INCONTINENCE SYMPTOMS TO HEALTH PROFESSIONALS

Of the 9.2% (31) respondents who reported anal incontinence at one year, only three (9.7%) disclosed their condition to a health professional. In each case, this was to their GP. Those who disclosed had higher mean incontinence severity scores (63.33), incontinence impact scores (mean 75) and general health impact scores (66.67) than those who did not disclose, although only severity scores reached statistical significance ( $U=10.0$ ,  $p=.030$ ,  $r=.42$ ). All three of the people who disclosed, also had stress incontinence.

#### 4.20.4 DISCLOSURE OF ANAL INCONTINENCE SYMPTOMS TO PARTNER

Of the 31 respondents with anal incontinence, 28 had an intimate partner. Only six (21.4%) told their partner about their anal incontinence. Of these six, five had stress incontinence and three had urge incontinence in addition to their anal incontinence. Three reported UI during intercourse and one had faecal incontinence during intercourse. All were experiencing faecal urgency with incontinence of loose faecal

material. Only one person believed their condition was affecting their relationship. Scores for SE, SD and SP were not significantly different from those who did not disclose.

#### 4.20.5 FREE TEXT RESPONSES

At one year postnatal, respondents were given an opportunity to provide free text on any aspect covered by the questionnaires. Of the 126 respondents reporting urinary symptoms, 18% (23) provided free text comments. This tended to be a commentary on the symptoms already described in the questionnaire and the methods they employed to cope with them. For example, a comprehensive knowledge of public toilets, where they were located, how much you had to pay to use them and the facilities available. Also, adjustments to dietary intake, including fluid restriction and not drinking after a specific time in the evening.

In addition, most of those who provided free text responses (21) provided details of their embarrassment and practical difficulties in disclosing to a health professional, particularly in getting an appointment with their GP and reluctance to discuss their condition for fear of not being taken seriously or wasting the professionals time. Of those who commented, 61% (14) requested free access to a specialist who would understand their condition, without the need to be referred by their GP.

Of the 31 respondents who reported anal incontinence symptoms, 58% (18) provided free text commentary, again focusing on their condition and coping mechanisms. This included carrying toiletries and changes of underwear with them at all times, and an avoidance of social activities. Of those who commented, 67% (12) thanked the researcher for giving them an opportunity to express their concerns and hoped that services would improve for people in their position as a result of the research.

All those with either UI and/or anal incontinence who had not disclosed to a health professional (130) were asked to write the reasons why they had not told a health professional about their condition. The most common reasons given for non-disclosure of urinary or anal incontinence are summarised in Table 4.21.

Reason for non-disclosure	% (n)
I'm too embarrassed	83% (108)
Fear of not being taken seriously	75% (98)
Don't want to waste their time (GP)	73% (95)
It's getting better	32% (42)
I'm dealing with it myself	31% (40)
There's nothing anyone can do	29% (38)
It's my own fault – I didn't do my postnatal exercises	27% (35)
They won't believe me	24% (31)
It's too difficult to get an appointment and when I do get there, I get too embarrassed and say I've gone for something else	9% (12)
I don't know where to go or who to tell	6% (8)

Table 4.21: Reasons for non-disclosure to health professional

4.21 SUMMARY OF RESULTS

This section presents a summary of key results only. For further discussion and denominator data, please see sections above.

4.21.1 RISK FACTORS

Tables 4.22 and 4.23 summarise the rates of reported UI and anal incontinence for the risk factors explored. However, it has already been established that risk factors vary for differing types of incontinence. A one-way between groups Multivariate Analysis of Variance (MANOVA) was performed to investigate difference in characteristics of the continent and incontinence groups at one year postnatal. Three dependent variables were used: age, BMI and baby birth weight. The analysis was repeated using any urinary incontinence, stress incontinence, urge incontinence and anal incontinence each in turn, as an independent variable. Preliminary assumption testing was conducted. No serious violations were noted.

	any antenatal incontinence				6 weeks any incontinence				6 months any incontinence				1 year any incontinence				1 year any anal incontinence				
	no		yes		no		yes		no		yes		no		yes		no		yes		
	Count	Row N %	Cou nt	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	
AGE (Banded)	<= 21	39	52.7%	35	47.3%	48	60.0%	32	40.0%	45	60.0%	30	40.0%	41	66.1%	21	33.9%	79	92.9%	6	7.1%
	22 - 27	44	55.7%	35	44.3%	55	66.3%	28	33.7%	49	63.6%	28	36.4%	51	75.0%	17	25.0%	79	89.8%	9	10.2%
	28 - 30	56	68.3%	26	31.7%	68	75.6%	22	24.4%	59	69.4%	26	30.6%	50	72.5%	19	27.5%	88	95.7%	4	4.3%
	31 - 32	27	49.1%	28	50.9%	41	65.1%	22	34.9%	39	62.9%	23	37.1%	33	64.7%	18	35.3%	62	96.9%	2	3.1%
	33+	45	68.2%	21	31.8%	51	72.9%	19	27.1%	45	66.2%	23	33.8%	45	71.4%	18	28.6%	65	89.0%	8	11.0%
BMI (Banded)	Total	211	59.3%	145	40.7%	263	68.1%	123	31.9%	237	64.6%	130	35.4%	220	70.3%	93	29.7%	373	92.8%	29	7.2%
	<= 22	58	56.9%	44	43.1%	70	63.6%	40	36.4%	59	56.2%	46	43.8%	60	66.7%	30	33.3%	111	94.9%	6	5.1%
	23 - 23	29	67.4%	14	32.6%	29	67.4%	14	32.6%	25	62.5%	15	37.5%	27	73.0%	10	27.0%	38	84.4%	7	15.6%
	24 - 25	45	61.6%	28	38.4%	53	67.1%	26	32.9%	52	70.3%	22	29.7%	42	71.2%	17	28.8%	78	96.3%	3	3.7%
	26 - 29	59	69.4%	26	30.6%	70	76.1%	22	23.9%	65	73.0%	24	27.0%	58	74.4%	20	25.6%	90	94.7%	5	5.3%
deliverymode	30+	20	37.7%	33	62.3%	41	66.1%	21	33.9%	36	61.0%	23	39.0%	33	67.3%	16	32.7%	56	87.5%	8	12.5%
	elective CS	15	60.0%	10	40.0%	26	96.3%	1	3.7%	22	84.6%	4	15.4%	20	83.3%	4	16.7%	27	100.0%		
	emergency CS	46	63.9%	26	36.1%	55	73.3%	20	26.7%	45	62.5%	27	37.5%	44	73.3%	16	26.7%	70	92.1%	6	7.9%
	forceps	24	63.2%	14	36.8%	24	60.0%	16	40.0%	20	50.0%	20	50.0%	20	57.1%	15	42.9%	38	92.7%	3	7.3%
	ventouse	32	69.6%	14	30.4%	32	66.7%	16	33.3%	30	68.2%	14	31.8%	26	70.3%	11	29.7%	50	96.2%	2	3.8%
BABY BIRTHWEIGHT (Banded)	normal delivery	93	53.4%	81	46.6%	124	63.6%	71	36.4%	118	64.1%	66	35.9%	109	69.9%	47	30.1%	185	90.2%	20	9.8%
	<= 2860	30	63.8%	17	36.2%	42	75.0%	14	25.0%	36	66.7%	18	33.3%	28	71.8%	11	28.2%	55	98.2%	1	1.8%
	2861 - 3170	34	66.7%	17	33.3%	31	58.5%	22	41.5%	29	56.9%	22	43.1%	30	65.2%	16	34.8%	51	91.1%	5	8.9%
	3171 - 3320	25	49.0%	26	51.0%	35	68.6%	16	31.4%	32	66.7%	16	33.3%	33	73.3%	12	26.7%	50	89.3%	6	10.7%
	3321 - 3470	25	52.1%	23	47.9%	39	76.5%	12	23.5%	38	76.0%	12	24.0%	27	69.2%	12	30.8%	52	94.5%	3	5.5%
DEGREE OF PERINEAL TEAR (Banded)	3471 - 3650	28	52.8%	25	47.2%	34	58.6%	24	41.4%	30	54.5%	25	45.5%	30	63.8%	17	36.2%	54	93.1%	4	6.9%
	3651 - 3910	34	70.8%	14	29.2%	38	71.7%	15	28.3%	36	70.6%	15	29.4%	33	75.0%	11	25.0%	52	94.5%	3	5.5%
	3911+	29	61.7%	18	38.3%	37	71.2%	15	28.8%	28	60.9%	18	39.1%	31	73.8%	11	26.2%	49	90.7%	5	9.3%
	intact	75	60.0%	50	40.0%	105	78.4%	29	21.6%	91	70.0%	39	30.0%	84	77.8%	24	22.2%	134	96.4%	5	3.6%
	1st degree	19	55.9%	15	44.1%	30	76.9%	9	23.1%	28	75.7%	9	24.3%	19	63.3%	11	36.7%	35	89.7%	4	10.3%
episiotomy	2nd degree	35	56.5%	27	43.5%	43	62.3%	26	37.7%	44	69.8%	19	30.2%	42	73.7%	15	26.3%	63	86.3%	10	13.7%
	3rd/4th degree	3	42.9%	4	57.1%	1	16.7%	5	83.3%	2	33.3%	4	66.7%	2	40.0%	3	60.0%	6	85.7%	1	14.3%
	Total	80	61.5%	50	38.5%	84	60.0%	56	40.0%	72	54.1%	61	45.9%	74	64.3%	41	35.7%	135	92.5%	11	7.5%

Table 4.22: Summary of incontinence rates for risk factors (percentile categories) Table 4.22: Summary of incontinence rates for risk factors (percentile categories)

	any antenatal incontinence				6 weeks any incontinence				6 months any incontinence				1 year any incontinence				1 year any anal incontinence			
	no		yes		no		yes		no		yes		no		yes		no		yes	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
age 2																				
<20	34	50.7%	33	49.3%	42	57.5%	31	42.5%	40	58.8%	28	41.2%	35	62.5%	21	37.5%	71	92.2%	6	7.8%
21-25	28	54.9%	23	45.1%	37	67.3%	18	32.7%	35	70.0%	15	30.0%	33	78.6%	9	21.4%	56	94.9%	3	5.1%
26-30	77	65.8%	40	34.2%	92	73.6%	33	26.4%	78	65.5%	41	34.5%	74	73.3%	27	26.7%	119	92.2%	10	7.8%
31-35	62	61.4%	39	38.6%	79	69.9%	34	30.1%	72	65.5%	38	34.5%	63	67.0%	31	33.0%	111	94.9%	6	5.1%
>35	10	50.0%	10	50.0%	13	65.0%	7	35.0%	12	60.0%	8	40.0%	15	75.0%	5	25.0%	16	80.0%	4	20.0%
BMI (Banded)																				
<20	21	60.0%	14	40.0%	16	43.2%	21	56.8%	17	50.0%	17	50.0%	19	65.5%	10	34.5%	35	92.1%	3	7.9%
21-25	111	60.7%	72	39.3%	136	69.7%	59	30.3%	119	64.3%	66	35.7%	110	70.1%	47	29.9%	192	93.7%	13	6.3%
26-30	60	63.8%	34	36.2%	77	75.5%	25	24.5%	72	73.5%	26	26.5%	63	74.1%	22	25.9%	101	95.3%	5	4.7%
31-35	16	53.3%	14	46.7%	25	71.4%	10	28.6%	21	61.8%	13	38.2%	18	62.1%	11	37.9%	28	80.0%	7	20.0%
35-40	3	25.0%	9	75.0%	9	60.0%	6	40.0%	8	57.1%	6	42.9%	9	75.0%	3	25.0%	15	93.8%	1	6.3%
>40			2	100.0%			2	100.0%					1	100%			2	100.0%		
BABY																				
<=2KG	4	66.7%	2	33.3%	6	100%			5	83.3%	1	16.7%	2	50.0%	2	50.0%	6	100.0%		
BIRTHWEIGH																				
2-2.5KG	8	61.5%	5	38.5%	8	57.1%	6	42.9%	6	42.9%	8	57.1%	6	54.5%	5	45.5%	13	92.9%	1	7.1%
2.5-3KG	27	67.5%	13	32.5%	36	72.0%	14	28.0%	31	66.0%	16	34.0%	27	75.0%	9	25.0%	49	98.0%	1	2.0%
3-3.5KG	78	53.8%	67	46.2%	103	68.7%	47	31.3%	97	67.4%	47	32.6%	87	69.6%	38	30.4%	149	92.0%	13	8.0%
3.5-4KG	62	62.0%	38	38.0%	72	65.5%	38	34.5%	67	64.4%	37	35.6%	63	70.0%	27	30.0%	104	92.9%	8	7.1%
4-4.5KG	24	63.2%	14	36.8%	27	69.2%	12	30.8%	21	58.3%	15	41.7%	25	75.8%	8	24.2%	38	92.7%	3	7.3%
4.5-5KG	2	66.7%	1	33.3%	3	75.0%	1	25.0%	1	33.3%	2	66.7%	2	66.7%	1	33.3%	3	75.0%	1	25.0%
>5KG					1	100%			1	100.0%							1	100.0%		

Table 4.23: Summary of incontinence rates for risk factors (incremental categories)



4.21.1.1 Any urinary incontinence at one year

Age, BMI and birth weight were not significantly associated with reporting of “any” urinary incontinence at one year postnatal (Table 4.24).

Any urinary incontinence at one year									
	No				Yes				P
	Minimum	Maximum	Mean	SD	Minimum	Maximum	Mean	SD	
BMI	17.00	42.00	25.45	4.54	17.00	39.00	25.25	4.56	0.67
AGE	16.00	40.00	27.80	5.69	15.00	40.00	27.29	6.32	0.76
BABY BIRTHWEIGHT	1770.00	4930.00	3416.08	498.87	806.00	4570.00	3328.67	590.41	0.45

Table 4.24: Any incontinence at one year (BMI, age and birth weight)

At one year postnatal, 16.7% of the elective CS group were reporting some form of urinary incontinence, compared to 23.8% of the remaining participants. This may suggest that factors not associated with labour and delivery, for example, hormonal factors, neurological and physical changes and the effect on the gravid uterus on internal structures, may contribute to a postnatal urinary incontinence rate of 16.7%. It would also suggest that factors associated with labour and vaginal delivery then add to this and increase the overall risk of incontinence to 23.8%. From this information, the clinical significance of the apparently protective effect of elective CS can be calculated. Number Needed to Treat (NNT) gives the estimated number of patients who would need to under go a specific intervention (elective CS) in order to reduce the adverse outcome (any urinary incontinence at one year) by one. Based on this research, seven patients would need to have an elective CS in order to prevent one case of urinary incontinence at one year postnatal (NNT = 7; 95% CI 3-12).

4.21.1.2 Stress incontinence

Age, BMI and birth weight were not significantly associated with reporting of stress incontinence at one year postnatal (Table 4.25). Stress incontinence is associated with bladder emptying prior to the second stage of labour, forceps delivery and perineal trauma.

Any urinary STRESS incontinence at one year									
	No				Yes				P
	Minimum	Maximum	Mean	SD	Minimum	Maximum	Mean	SD	
BMI	17.00	42.00	25.43	4.52	17.00	39.00	25.27	4.59	0.78
AGE	16.00	40.00	27.84	5.63	15.00	40.00	27.65	5.88	0.34
BABY BIRTHWEIGHT	806.00	4930.00	3404.00	526.58	804.00	4930.00	3390.00	528.33	0.42

Table 4.25: Any stress incontinence at one year (BMI, age and birth weight)

The only way to be sure of avoiding a forceps delivery would be to have an elective CS. To prevent one case of stress incontinence at one year postnatal, nine additional elective CS would need to be performed (NNT=9; 95% CI 3-19).

4.21.1.3 Urge incontinence

There was a statistically significant difference between the group reporting any urge incontinence at one year, and those who did not report urge incontinence:  $F(3, 298)=6.71, p=.024$ ; Wilks Lambda .937; partial Eta squared = .063. On first glance, it would appear that all three variables reach statistical significance (Table 4.26). However, when large numbers of comparisons are made, there is an increased risk of Type 1 error. Post-hoc tests are designed to guard against this. Essentially the criteria for significance is more stringent. One alternative is to apply a Bonferroni adjustment. This involves dividing the alpha level (.05) by the number of comparisons, in this case three. This gives a new significance level of .017.

After the application of a Bonferroni correction, the dependent variables were considered separately. The only variable to reach statistical significance, using a Bonferroni adjusted alpha level of .017, was age:  $F(1, 300)=13.89, p<.001$ ; partial Eta squared = .044. An inspection of the mean scores indicated lower levels of mean age in the group reporting urge incontinence at one year ( $M=24.92, SD= 6.52$ ) compared to those who did not report urge incontinence ( $M=28.14, SD 5.63$ ).

Any urinary URGE incontinence at one year									
	No				Yes				P
	Minimum	Maximum	Mean	SD	Minimum	Maximum	Mean	SD	
BMI	17.00	42.00	25.58	4.54	17.00	37.00	24.31	4.43	0.07
AGE	16.00	40.00	28.14	5.63	15.00	34.00	24.92	6.52	<.001
BABY BIRTHWEIGHT	1770.00	4930.00	3417.00	497.71	806.00	4180.00	3236.54	659.50	0.032

Table 4.26: Any urge incontinence at one year (BMI, age and birth weight)

4.21.1.4 Anal incontinence

Age, BMI and birth weight were not significantly associated with reporting of anal incontinence at one year postnatal (Table 4.27). Anal incontinence is associated with failure of bladder emptying prior to the second stage of labour and induction of labour. Elective caesarean section appears to be protective (NNT = 13) although confidence intervals can not be calculated due to small sample size.

Any anal incontinence at one year									
	No				Yes				P
	Minimum	Maximum	Mean	SD	Minimum	Maximum	Mean	SD	
BMI	17.00	42.00	25.33	4.57	17.00	36.00	26.03	4.97	0.48
AGE	15.00	40.00	27.28	5.84	16.00	38.00	27.59	6.63	0.84
BABY BIRTHWEIGHT	806.00	5310.00	3374.53	541.64	2350.00	4570.00	3497.59	485.77	0.42

Table 4.27: Any anal incontinence at one year (BMI, age and birth weight)

4.21.2 QUALITY OF LIFE

Urinary incontinence has an adverse impact on all quality of life domains, with sleep/energy affected the most and social or relationship domains affected the least. Anal incontinence also impacts on all QoL domains, with emotion affected the most and relationship the least. However, intercourse incontinence has a greater overall impact on QoL domains than either urinary or anal incontinence. Sleep/energy is affected the most, closely followed by relationship and emotion. The domain affected the least is social.

### 4.21.3 SEXUALITY

Respondents reporting either UI or anal incontinence reported less sexual depression than those who were continent. However, those reporting intercourse incontinence were more sexually depressed at 6 months. This remained fairly static and by one year, sexual depression amongst the intercourse incontinence group was less than in the continent group.

### 4.21.4 DISCLOSURE

Disclosure rates to either health professionals or intimate partners are low, primarily due to embarrassment and a fear of not being taken seriously. Those who do disclose tend to have a multiplicity of symptoms.

### 4.21.5 IN SUMMARY: A RETURN TO THE HYPOTHESES

To summarise, the hypotheses stated in Section 3.5 will be revisited.

- i. There is a positive relationship between childbirth and urinary incontinence as measured by the Kings Health Questionnaire.

The findings of this research suggest that there is a positive relationship between childbirth and incontinence. Compared to nulliparous controls, urinary incontinence rates after childbirth are considerably higher.

- ii. There is a positive relationship between childbirth and anal incontinence as measured by the Manchester Health Questionnaire.

Findings from this research support this hypothesis. Whilst minimal comparative data is available, none of the women in this study had anal incontinence symptoms prior to pregnancy.

- iii. There are identifiable obstetric, fetal or social factors that contribute to the risk of anal and urinary incontinence.

Data from the results chapter and also from the sections earlier in this chapter demonstrate that there are in fact several identifiable factors that increase the risk and/or severity of urinary and anal incontinence symptoms.

- iv. Incontinence has a detrimental impact on quality of life as measured by the Kings Health and Manchester Health questionnaires.

Incontinence does have an adverse impact on all quality of life domains. Anal incontinence has a far greater impact than urinary incontinence (Figure 4.29). For both urinary and anal incontinence, the emotion domain appears to be affected the greatest.

- v. Urinary incontinence has an adverse effect on female sexuality as measured by the Sexuality Scale.

Although there were some anomalies; namely high levels of sexual depression at 6 months postnatal amongst the intercourse incontinence group; on the whole, those who reported urinary incontinence had greater sexual esteem and lower sexual depression than the continent group. The hypothesis is not supported and must be rejected in favour of the null hypotheses: there is no significant difference in sexuality scores between the continence and incontinence groups.

- vi. Anal incontinence has an adverse effect on female sexuality as measured by the Sexuality Scale

Again, the group with anal incontinence were significantly less sexually depressed than the continent group. The hypothesis can be rejected as there was no *adverse* effect. The null hypothesis must also be rejected as there was a significant difference. The difference appears to be positive. This may be as a result of other psychological processes employed to protect the self.

- vii. Incontinence has an adverse impact on intimate relationships, as measured by the relationship domains of the QoL tools used, the free text responses and the Sexuality Scale.

Although the relationship domain was effected by urinary and anal incontinence, it was effected the least of all QoL domains. However, the impact of intercourse incontinence on intimate relationships seems to be cumulative, with impact increasing over time. The hypothesis is supported by the results of this research. The impact on intimate relationships conflicts with the sexuality findings, supporting the theory of a psychological defence mechanism at work, the nature of which has not been fully explored by this research.

- viii. Women do not discuss continence or sexuality problems with health professionals.

Very few women discuss their incontinence problems with a health professional. The main reasons for non-disclosure were embarrassment, not wanting to waste the doctor's time and a fear of not being taken seriously. Overall, the hypothesis is supported. Only those with multiple, complex symptoms tend to disclose.

## **CHAPTER 5 DISCUSSION**

### **5.1 INTRODUCTION**

Urinary and anal incontinence associated with pregnancy and childbirth affects numerous women worldwide. Incontinence has a major impact on physical, psychological and emotional health. This study was designed to build on previous research and explore obstetric and social risk factors that increase the prevalence of urinary and anal incontinence. The longitudinal, prospective design aimed to identify risk factors for the development of incontinence, and correlate incontinence data with sexuality data in order to explore the impact of incontinence on sexual esteem, sexual depression and sexual preoccupation. In addition, perception and experiences of disclosure of incontinence symptoms to intimate partners and health professionals were investigated. This chapter will synthesise the results of this study with the outcomes of previous research. Validity of the findings, generalisability, limitations and implications for future research will be explored.

Participants were all in their first pregnancy. Having been identified early in pregnancy, they were recruited at 20 weeks gestation and followed up until one year postnatal. During this time, they received questionnaires at 30 weeks gestation, and postnatally at 6 weeks, 6 months and one year.

The null hypotheses were that childbirth would not be associated with urinary or anal incontinence; sexuality would not be affected by incontinence; risk factors would not be identified and those experiencing difficulties would access health care freely.

### **5.2 DISCUSSION OF MAIN RESEARCH FINDINGS**

In this section, the main research findings will be discussed in the light of existing knowledge and theories.

### 5.2.1 RECRUITMENT AND RESPONSE RATES

Of those eligible to take part in this study, 84.1% enrolled. Of those who enrolled, response rate (determined by at least two of the three postnatal questionnaires being completed) was 59.9%. This gave an overall sample size of 516 of which, 466 respondents completed the antenatal, 404 completed the 6 week postnatal, 397 completed the 6 months postnatal and 336 the one year postnatal questionnaires. Compared to similar previous studies (Chapter two, Section 2.2.2.2 and 2.2.2.3) this is the largest study examining the prevalence of urinary incontinence amongst primigravida women in the antenatal period and one of the largest covering the postnatal period. It is also comparable in sample size to other studies looking specifically at anal incontinence in first time mothers (Section 2.3.2.3).

### 5.2.2 PREVALENCE OF URINARY AND ANAL INCONTINENCE SYMPTOMS

Previous reported rates of antenatal stress incontinence range from 9-77%. In this study, the rate of stress incontinence antenatally was 39.7% and so lies within previously reported rates. Previously reported rates of antenatal urge incontinence range from 8-54%. In this study, the reported rate of antenatal urge incontinence was 23.5%. Again, this lies within the range of previously reported rates.

Although several studies have reported rates for urinary incontinence, there has been little published regarding symptomology. This study provides detailed data on symptomology both during the antenatal period and over the first postnatal year. The majority of women reported frequency (72.3%) and nocturia (76.2%) antenatally, as may be expected given the physiological changes to the lower urinary tract. However, frequent urine infection (14.6%) and bladder pain (16.1%) were also common.

Postnatal stress incontinence has been reported as low as 5% when measured via urodynamic assessment; or as high as 77% when self reported questionnaire was used. In this study, the rate of stress incontinence during the first postnatal year fluctuated little, being 28.2% at six weeks, 31% at six months and 26.5% at one year postnatal.



Reported rates of postnatal urge incontinence range from 7% when measured using urodynamic assessment, to 15% when a questionnaire was used. In this study, the reported rate was 21.2% at six weeks, 21.4% at six months and 16.4% at one year postnatal. This prevalence is higher than that previously reported. However, published research often generalises incontinence and reports an overall prevalence, rather than specifying type, and this may account for some of the discrepancy. Additionally, the categorisation of incontinence type is based on patient self assessment, not urodynamic investigation. This may not be accurate.

A number of women reported new onset stress or urge incontinence throughout the postnatal year. It is not clear if this is a true new onset, or if the perception of the individual has influenced their response. Of those reporting new onset stress, or stress and urge incontinence at six month postnatal, 84% stated that their bladder problem was actually the same or better than before. This would suggest that it is their perception of their incontinence that has changed, rather than a true new onset of symptoms occurring. In contrast, 45% of those reporting new onset urge incontinence only, stated that their bladder problem was getting worse, possibly indicating true new onset of symptoms.

Generally, the reported rate of urinary symptoms changed little over the course of the first 6 months postnatally (Chapter 4, Figure 4.4 and 4.5). Although 83% experienced urinary symptoms during pregnancy, this fell to 55% at 6 weeks, 56% at 6 months and 38% at one year postnatal with frequency, nocturia and stress incontinence being the most common symptoms. Severity scores recorded antenatally did not correlate with those reported postnatally. Based on self-perception and severity scores, most people improved over time suggesting that urinary incontinence postnatally is a regressive condition.

At one year postnatal, 9.39% of respondents reported anal incontinence and 6.97% reported incontinence of faeces. Studies of similar size, population and method have reported rates of anal incontinence at 9-26% and faecal incontinence 1-4%.

One possible explanation for the lower rate of anal incontinence lies in the design or methods employed. Respondents were given an opportunity to tick a box stating that they did not have any bowel related symptoms at the start of the Manchester Health Questionnaire, thus negating the need to go through every question. Those who were incontinent of wind only may not have considered this a bowel related problem and, as such, may not have completed the questionnaire. The reported rate of faecal incontinence is higher than that reported in similar studies.

Faecal urgency was the most common reported symptom and was present in 8.03% of all replies and 87.1% of those with anal incontinence symptoms. Urgency is normally associated with external anal sphincter trauma, suggesting that in the majority of women reporting anal incontinence symptoms in this study, there was a degree of undetected sphincter damage. Whilst anal sphincter trauma is normally direct, indirect trauma could be associated with nerve damage to the muscle, leading to dysfunction.

### 5.2.3 RISK FACTORS FOR THE DEVELOPMENT OF URINARY AND ANAL INCONTINENCE

The stress continence control system can be divided anatomically into two parts: the urethral support system and the sphincteric closure system.<sup>427</sup> The urethral support system consists of all the structures external to the urethra that provide a supportive layer upon which the urethra rests, and include the anterior vaginal wall, the endopelvic fascia, and the levator ani muscles. Urethral sphincteric closure is normally provided by a combination of urethral muscle, intact neurological processes and the vascular elements within the sub mucosa. Stress incontinence arises from problems with the urethral sphincter mechanism as well as with urethral support.<sup>427</sup>

In a urodynamic model, urge urinary incontinence results from some combination of detrusor over activity, detrusor or urethral hypersensitivity and poor detrusor–sphincter coordination. The cause may be sensory dysfunction and/or motor over-activity. Disordered sensory or motor function results in unintended detrusor contractions, which overcome urethral resistance and urge incontinence occurs.<sup>428</sup> As opposed to the urodynamic urge incontinence, functional urge incontinence may also be present. Here, pre-emptive voiding and poor sphincter control can combine to keep

the bladder empty. As such, both stress and urge incontinence may have sphincter, bladder, neuromuscular or cognitive origins.

The mechanism by which anal continence is maintained relies on a combination of pelvic floor musculature condition, neurological pathways being intact, conscious control and intact anal sphincters. For an obstetric population, the most common risk to the anal continence mechanism arises from sphincter and musculature damage or neuropathy. Faecal urgency is commonly associated with disruption of the external anal sphincter mechanism, whilst passive faecal incontinence as an isolated symptom is more commonly associated with smooth muscle damage or internal anal sphincter disruption.<sup>218</sup> Although previous studies have linked anal incontinence to neurological damage, this appears to be a reversible phenomenon linked to the most likely explanation for the condition – that of structural damage.

Generally, urinary incontinence appears to be a regressive condition. However, those respondents who reported a progressive deterioration in their condition, supported by increase in severity scores and perceived worsening of symptoms, tended to have a higher BMI and longer periods of time in labour without their bladder being emptied.

#### **5.2.3.1 Age**

As with many previous studies, age, when explored as a continuous variable, did not correlate significantly with urinary incontinence. However, when examined using incremental or percentile categories, findings of some previous research were confirmed in that those under the age of 21 years had a higher prevalence of urinary incontinence.

In contrast to previous results, which have found stress incontinence rates to be higher in the younger age groups; differences in stress incontinence rates did not reach statistical significance. However, urge incontinence and severity rates were significantly higher at all three postnatal time intervals, with age  $\leq 20$  years explaining 10.89% of the variance in reported urge incontinence. This association between younger age groups and higher rates of urge incontinence has not previously been reported in published research. The explanation for this finding is not clear. One

possible contributing factor could be bladder and urethral sensitivity due to infection. Overall rates of reported frequent urinary infection during the postnatal period were in the region of 10%. Amongst the under 20 years age group, at one year postnatal, the rates of frequent urinary infection (17.9%) and bladder pain (25%) were considerably higher. Urge incontinence was significantly associated with frequent infection ( $r=.397$ ,  $p<.001$ ) explaining 15.76% of the variance. It is possible, that the frequent infections have led to a hypersensitive state in the bladder, or a predisposition to involuntary detrusor contraction, resulting in urge incontinence. What is not clear, is why the under 20 years age group was significantly associated with more urine infections compared to all other age groups ( $X^2=17.18$ , 4df,  $p=.002$ , Cramer's  $V$  .234).

Age was not associated with the development of anal incontinence. Although previous research has identified age as a risk factor for the development of anal incontinence, the research populations are not comparable to this study as they have focused on high risk deliveries, mixed parity populations or women over 35 years.

### **5.2.3.2 Body Mass Index**

On reviewing the available evidence, raised BMI is generally considered to be a risk factor for the development of postnatal urinary incontinence. The physiological explanation for this is related to extra weight secondary to obesity and pregnancy, leading to chronic straining and weakening of the pelvic floor integrity. The link with anal incontinence is inconclusive.

Results from this research conclude that BMI was not associated with reported rates of “any” urinary incontinence. Antenatal stress incontinence was significantly higher in the BMI  $>30$  group, supporting previous findings and the explanation provided above. However, rates of stress incontinence in the postnatal period did not reach statistical significance.

In contrast to stress incontinence, urge incontinence was associated with lower BMI groups. Specifically, BMI  $<20$  had the highest rates of urge incontinence throughout the postnatal year. One previous study has linked anorexia nervosa to urinary

incontinence, particularly urge incontinence,<sup>429</sup> with 24% of women with anorexia reporting urge incontinence. The authors believed that this may have been associated with reduced oestrogen production. The World Health Organisation is currently reviewing BMI classification to further consider ethnic diversity. However, currently it suggests that a BMI of  $\leq 18.49$  is considered underweight and  $\leq 17.5$  is generally associated with anorexia nervosa. It is possible that some of the respondents in the BMI  $< 20$  category were experiencing reduced oestrogen production postnatally, which had an adverse effect on their urinary systems.

Of those with postnatal urinary incontinence, 13.3% got worse over time. Spearman's Rho was used to analyse the results further. Those respondents whose symptoms got worse, or who developed new onset urinary incontinence, tended to have higher BMI ( $r=.379$ ,  $p=.017$ ) suggesting that raised BMI has a moderate effect on urinary incontinence and is associated with a deterioration of the condition and worsening symptomology over time. Most commonly reported symptoms in this group were pain, intercourse incontinence and nocturnal enuresis.

BMI as a predictor for anal incontinence remains inconclusive due to insufficient evidence. This study does not support an association between the prevalence of anal incontinence and raised BMI, although those respondents who reported faecal incontinence symptoms had higher severity scores when a higher BMI was present. Severity score is derived from behavioural modifications in an attempt to address symptoms and as such, is a subjective measure.

### **5.2.3.3 Birth weight**

There is controversy in the published literature regarding the contribution of fetal weight or size to the development of postnatal urinary incontinence. This research found no significant association between birth weight and maternal urinary incontinence. The contribution of fetal size to the development of anal incontinence remains controversial. In this study, birth weight was not a significant risk factor.

#### **5.2.3.4 Duration of labour**

Previous studies present contradictory results on the role of labour duration in the development of urinary incontinence. Part of the problem in exploring this area is that long labours are often associated with other compounding variables such as epidural anaesthesia, instrumental delivery or a large baby. In this study, duration of the first stage of labour, the second stage of labour or total labour were not found to be statistically significant to the development of urinary incontinence. Evidence is also conflicting for the association between length of labour and risk of anal incontinence. The larger studies do not support a correlation and that finding is supported by this study.

#### **5.2.3.5 Bladder emptying in labour**

No previous studies have recorded bladder emptying in labour. Although urine production decreases during labour as a physiological response to stress, other compounding factors need to be considered. For example, the use of intravenous fluids when an epidural is cited or when labour is induced/augmented with Oxytocin may counteract this physiological oliguria. In addition, bladder capacity is further reduced and the bladder itself may be compressed by the fetus. When an epidural anaesthetic has been sited, or opiates administered, bladder sensation may be impaired and the desire to void reduced.

This study examined:

- The time interval from bladder emptying to commencement of the second stage of labour.
- The time interval from bladder emptying until delivery of the baby.
- The maximum duration in the first stage of labour without the bladder being emptied.

As seen in Chapter Four, those respondents who did not empty their bladder for more than 4 hours prior to commencement of the second stage of labour were 1.94 times more likely to report any urinary incontinence and 2.36 times more likely to report stress incontinence at a year postnatal. In addition, if no voiding occurred for as long as 6 hours, this was associated with increased severity scores and a deterioration in urinary function over time. The mechanism for this is not clear, but it could be related

to defective urethral sphincter closure as a consequence of bladder compression and neurophysiological compromise. It would appear that the longer the bladder was exposed to these conditions, the more severe was the resulting urinary dysfunction.

These results support a reconsideration of midwifery and obstetric practice. Whilst currently, women in labour are encouraged to empty their bladder, should they fail to do so intervention by way of insertion of a urinary catheter is not normally initiated unless the bladder is palpable abdominally. This manual examination of the abdomen to determine urine volume in the bladder is by no means accurate. Given the long term sequelae outlined above when the bladder remains un-emptied for longer periods of time in labour, there is a strong case for advocating routine insertion of a urinary catheter should the woman be unable to void; particularly when factors which increase urine production as listed above, are present.

Those respondents not emptying their bladder for more than 6 hours prior to delivery reported significantly higher rates of anal incontinence at one year postnatal. No previous studies have explored bladder emptying in labour and the risk of anal incontinence. The precise mechanism for this phenomenon is not known, although it may be related to pelvic floor musculature damage, or neurological pathways being disrupted secondary to pressure injury. Given the small number of respondents with anal incontinence, a change in current practice is not supported. However, large scale studies that include the exploration of these variables are clearly suggested by these preliminary findings.

#### **5.2.3.6 Mode of delivery**

Although there are contradictory conclusions, generally vaginal delivery is considered a risk factor for the development of urinary incontinence. In this study, vaginal delivery was also associated with increased rates of stress incontinence. The greatest risk came from forceps delivery, often seen as the most traumatic to the pelvic floor. The odds ratio for developing stress incontinence after forceps delivery was found to be 2.41. The findings are generally consistent with previous studies. Consideration needs to be given to the reason for forceps usage in addition to the effect of forceps. In many cases a degree of soft tissue dystocia and other obstetric factors may be

present. Consequently, muscular and neuropathic damage may have occurred if the delivery had been allowed to progress without intervention.

Some previous research has found elective caesarean section to be protective against the development of urinary incontinence. Although results in the early postnatal period support this finding, the repeated measure, longitudinal design of this research demonstrated that, over time, this conclusion could not be supported. In this study, the rate of stress incontinence amongst women undergoing elective caesarean section increased steadily over time (Figure 4.18). By one year postnatal, the rate was higher than that previously reported in nulliparous women suggesting that pregnancy per se, as opposed to mode of delivery, has a prolonged adverse impact on the urinary system. Although reported urinary incontinence rates at one year postnatal were not as high as the vaginal delivery groups, what is evident is that the rate in the caesarean group increased steadily over time, a phenomenon not observed in those having a vaginal delivery. This can not be accounted for by transient hormonal changes. Neuropathic explanations would probably suggest a constant reporting rate. The explanation for progressive increase in prevalence over time is not clear. One possible explanation is that the levator ani muscle suffers neurological damage during pregnancy. The denervated muscles would then undergo atrophy and the endopelvic fascia would be solely responsible for supporting the pelvic organs. Over a period of time, these ligaments would gradually stretch leading to partial pelvic organ prolapse and stress incontinence.<sup>427</sup> Another possible explanation is that those having a CS were also those who had a higher BMI, thus falling into the group who reported a deterioration of their symptoms over time. Further analysis using one way ANOVA revealed that BMI in the CS group (Mean = 26.53) was indeed significantly higher than in the vaginal delivery group (Mean = 24.96,  $p=.003$ ) adding further evidence to a link between raised BMI with a progressive state of urinary dysfunction, independent of delivery mode.

There is a general consensus amongst previous studies that forceps delivery is significantly associated with an increased risk of developing anal incontinence. In this study, the majority of respondents who reported anal incontinence had a normal delivery. However, the odds ratio of anal incontinence when all deliveries were



compared did not reach statistical significance. As with previous findings, elective Caesarean section was found to be protective.

Given the Number Needed to Treat data (7 CS to prevent one urinary incontinence and 13 CS to prevent one anal incontinence) and the progressive increase over time of urinary incontinence in the elective CS group, the results do not seem to justify advocating elective CS for all.

#### **5.2.3.7 Feeding method**

There is minimal evidence in previous studies regarding feeding method and urinary incontinence. Problems with such data include mixed method feeding, dietary variations and increased fluid intake. In this study, feeding method was not associated with the prevalence or severity of urinary or anal incontinence.

#### **5.2.3.8 Induction of labour**

There is minimal evidence in previous studies examining the contribution of induction of labour to urinary incontinence. Problems with such data include method of induction, gestational variations and reasons for induction. In this study, induction or augmentation of labour, by vaginal prostaglandin, intravenous Syntocinon or artificial rupture of membranes, were not associated with the prevalence or severity of urinary incontinence.

Induction of labour has not previously been considered as a potential risk factor for the development of faecal incontinence. In this study, those respondents who had their labour induced were three times more likely to develop anal or faecal incontinence. This finding was independent of obstetric, fetal or maternal factors examined.

It may be that some other factor, rather than the actual process of induction contributed to the higher rates of anal incontinence in this group. However, 59% of those who were induced and went on to develop anal incontinence, were induced prior to 40 weeks gestation. The main reasons for induction were maternal hypertension and pre-labour ruptured membranes. Prolonged pregnancy, duration of labour, mode

of delivery, birth weight, BMI and perineal trauma were not significantly different from those who were induced and did not develop anal incontinence.

The most common symptom in this group was faecal urgency (83%) and faecal incontinence at rest (33%). This would suggest disruption of the anal sphincter even though a large proportion of participants had a caesarean section (27%). This phenomenon can not be explained. It may be that the sphincter damage is indirect and neuropathic, rather than secondary to direct trauma. The numbers in this group are relatively small and large studies, possibly involving endo-anal ultrasound, would need to be undertaken in order to assess the association between induction of labour and anal incontinence in greater detail.

#### **5.2.3.9 Epidural**

Postnatal urinary retention has been associated with the use of epidural anaesthesia. No women in this study reported postnatal urinary retention. Although one previous study linked epidural use to postnatal stress incontinence, the compounding factors of significantly longer labour in the epidural group render the results questionable. In this study, epidural anaesthesia was not associated with urinary incontinence. In line with previously published data, no association was found between anal incontinence and epidural anaesthesia.

#### **5.2.3.10 Smoking**

No association was found between smoking and the development of urinary incontinence, either antenatally or postnatally. When the amount of cigarette exposure was considered, even those smoking larger numbers per day (>20) still did not demonstrate a statistically significant increase in urinary incontinence. This is concurrent with the findings of Kristiansson<sup>76</sup> but contradicts Burgio<sup>89</sup>. In a general population, as opposed to an obstetric population, smoking has been associated with the development of urinary incontinence. However, the age of respondents is often higher. Further research is needed to consider the impact of smoking on urinary incontinence for an obstetric population, with consideration given to total number of years smoking, rather than just the number of cigarettes smoked. This would give a more accurate dosing effect. An additional consideration, is the honesty of replies.

Many pregnant women are frowned upon for smoking and receive literature and health advice throughout their pregnancy on the potentially adverse effects that smoking can have on the developing fetus and newborn baby. It may be that this social pressure has influenced the accuracy of the replies they have given, although this is purely speculative. Smoking was not associated with the development of postnatal anal incontinence.

#### **5.2.3.11 Perineal trauma**

Most previous work on perineal trauma has focused on anal incontinence as opposed to urinary incontinence. Those studies which have looked at perineal trauma and urinary incontinence have generally focused on the contribution made by episiotomy. This study explored urinary incontinence and all aspects of perineal trauma.

Whilst previous research has identified third and fourth degree tears as a risk for anal incontinence, as described in Chapter Two, this study found very high rates of stress incontinence in this group. Almost all women in this category reported stress incontinence at 6 weeks postnatal and over half had persistent, long term stress incontinence at one year (Figure 4.20).

This finding supports the Hammock hypothesis.<sup>152</sup> Disruption to the endopelvic fascia and levator ani muscle during vaginal delivery, disrupts support to the bladder neck and urethral position, leading to postnatal stress incontinence. The high incidence of stress incontinence in the group with anal sphincter trauma also seems logical, as a birth that is sufficiently traumatic to injure the anal sphincter muscle may be expected to be more likely to also injure the levator ani muscle.<sup>427</sup>

Identified third and fourth degree tears are established risk factors for anal incontinence. In this study, seven women (1.7%) had recognised anal sphincter damage. None of the cases reviewed contained detailed classification of anal sphincter trauma as advocated by the Royal College of Obstetricians and Gynaecologists (Section 2.4.3.7). Only one respondent who had a fourth degree tear reported anal incontinence symptoms. The remaining six who had a third degree tear did not report symptoms. This is surprising, as previous studies have reported anal incontinence

rates following anal sphincter damage as high as 59%. However, the women in this study were followed up in a dedicated perineal trauma clinic with input from an obstetrician and colo-rectal surgeon as necessary. They received greater monitoring, advice and intervention. This may have proven effective in reducing their symptoms. An alternative possibility is that symptoms have not yet developed.

As outlined in Chapter Two, up to 28% of primiparous women may experience anal sphincter damage, which is often undetected at the time of delivery. The higher rates of anal incontinence and faecal urgency found in this study suggest a degree of under reported or unrecognised anal sphincter trauma which has led to the development of anal incontinence symptoms. As most women reporting symptoms had normal vaginal deliveries, this is a midwifery practice issue and may be related to professional attitudes, competence and skill or an unwillingness to perform a rectal examination and assess trauma thoroughly. Further research into this area is required.

#### 5.2.4 THE IMPACT OF URINARY INCONTINENCE ON QUALITY OF LIFE

In many previous studies, urinary incontinence has been shown to have a detrimental impact on quality of life. Those women reporting symptoms suggestive of detrusor over-activity, a condition associated with urgency, nocturnal enuresis and possibly urge incontinence, were affected the most. Often behaviour is modified and social activity is reduced. Depression and adverse effect on relationships has also been reported.

One of the challenges of using health related QoL instruments is the ability to translate statistically significant changes into clinically significant ones. For the King's Health Questionnaire, as with most QoL instruments, a change of five points (5%) is clinically meaningful. The results of this study demonstrate considerably larger changes in scores than this, suggesting the statistically significant conclusions are also clinically meaningful.

##### **5.2.4.1 General Health Perception**

The King's Health Questionnaire asks respondents to indicate their perception of their general health. In this study, those experiencing nocturnal enuresis, bladder pain,

frequent urinary infection or intercourse incontinence perceived their general health to be significantly worse than those experiencing other symptoms. However, general health was still perceived to be good antenatally and good to fair throughout the postnatal period, by those who were symptomatic.

#### **5.2.4.2 Incontinence Impact**

During the antenatal period and up to 6 month postnatal, the impact of urinary symptoms was reported to be minimal. However, by one year postnatal, the impact was high. In particular, those reporting nocturnal enuresis, pain and intercourse incontinence were reporting a much higher impact of the symptoms on their health. As the reported rates of these symptoms did not increase, this would suggest one of two possibilities: firstly, either the severity of these conditions got worse for those who were experiencing them, suggesting a deterioration and a progressive state; or secondly, the condition did not change, but the impact on the health and life style of the individuals increased.

#### **5.2.4.3 Severity**

Severity was measured by the extent to which behaviour was modified in order to address symptoms. Most respondents believed the severity of their condition to decrease over a period of time; the behaviour modifications employed were less. The exception was at one-year postnatal, when those reporting symptoms of nocturnal enuresis, pain and intercourse incontinence reported a significant increase in severity scores. When viewed in conjunction with incontinence impact scores, it would seem that those people with these symptoms may experience a progressive deterioration of symptoms over time.

#### **5.2.4.4 Quality of life domains**

Urge incontinence had the greatest impact on sleep/energy and emotion. The least impact was on the relationship domain. Stress incontinence had the greatest impact on physical and emotion domains, with least impact on relationship and social. Intercourse incontinence had the greatest overall impact on QoL, surpassing all other urinary or anal incontinence symptoms. The impact of all symptoms on all QoL domains increased at one year, suggesting that when symptoms persist over a long

period of time, their impact on all QoL domains is cumulative, even if the severity of the condition itself is reducing.

It is difficult to compare QoL studies due to difference in method and research tools. In this research, of all urinary symptoms reported, nocturnal enuresis, pain, intercourse incontinence and to some extent, urge incontinence have the greatest overall detrimental impact on quality of life. These symptoms appear to get worse over time with a corresponding greater detrimental impact on all quality of life domains. The greatest impact appears to be on the emotion domain. There is evidence of behaviour modification to address symptoms and again, this increases as the condition deteriorates. Generally, these findings are concurrent with previous QoL research, that also demonstrates urge incontinence as having a greater impact on QoL domains with greatest impact on social or emotional, rather than on functional domains.

#### 5.2.5 THE IMPACT OF ANAL INCONTINENCE ON QUALITY OF LIFE

Previous work is limited but does suggest that faecal incontinence has an adverse impact on QoL, particularly emotional indicators such as anxiety or depression. In this research, anal incontinence and faecal incontinence were found to be equally detrimental to QoL.

Anal incontinence when coughing or walking and an inability to keep clean had the highest impact on perceived general health. These symptoms also resulted in a significant impact on life style and behaviour. All QoL domains were affected. As with urinary incontinence, the relationship domain showed least impact whilst emotion was affected the most. The greatest overall impact of anal incontinence was significantly higher than that of urinary incontinence. These findings present a detailed insight into the effect that anal incontinence has on the life style of otherwise healthy individuals.

### 5.2.6 DISCLOSURE OF SYMPTOMS

As with previous research findings, the rate of disclosure of symptoms to a health professional was very low. Disclosure rates were lower than recorded in a general population and this may be because the participants in this study felt their symptoms were, or would get better. Almost a third initiated self treatment, consistent with other research findings. A perception of guilt and self blame was present for 27% of respondents. However, the overwhelming reason for non-disclosure was embarrassment. Concurrent with previous findings, there was a belief that their condition was not severe enough and nothing could be done anyway. Given that pregnant and postnatal women generally have more contact with a larger number of health professionals than any other generally well section of the population, this lack of knowledge and misperception is an area professionals must address if incontinence is to be identified and treated.

This study explored disclosure with intimate partners. There are no previous comparative studies with which results can be compared. A third of women with urinary incontinence and approximately a fifth of those with anal incontinence disclosed their symptoms to their partner. Those most likely to disclose were experiencing a multiplicity of symptoms usually involving both urinary and anal incontinence. Most respondents believed that their incontinence symptoms were not adversely affecting their relationship. Although QoL data suggests that the relationship domain was affected, compared to the other domains the impact was far less.

Many respondents gave detailed accounts of the behaviour modifications and thanked the researcher for giving them an opportunity to discuss their symptoms. From these findings it would appear that women do want help and advice, but are too embarrassed to disclose within the current health service provision where a face-to-face discussion is required. Alternative forms of communication and/or service provision may be more effective.

### 5.2.7 THE IMPACT OF PREGNANCY AND CHILDBIRTH ON SEXUALITY

The finding that sexual preoccupation correlated positively with sexual depression, as normally found in a male population, was consistent throughout the postnatal period. Normative data from the same geographical, cultural group who had not had a baby, suggests that this phenomenon is peculiar to the event of pregnancy and childbirth. Given that the finding was still present at one year postnatal, further exploration would be needed over a longer period of time to determine the duration of this effect. Sexual preoccupation as a variable does not give an indication of the nature of the thoughts experienced. It may be that nulliparous women or men experience positive sexual preoccupation with a concentration on desire and pleasure. In contrast, pregnant and postnatal women may experience sexual preoccupation as a negative cognition with a focus on avoidance or performance anxiety. This is speculative, but would account for the observed associations in variables. If they are thinking about sex in a negative way, they may feel more depressed.

Generally, throughout pregnancy and the postnatal period, sexual depression (known to correlate with guilt, shame, sexual self criticism and self consciousness) is high and sexual esteem (known to correlate with reduced inhibition, positive body image and feeling romantic) is low. This may be accounted for by changes in hormonal status, body image changes, life style changes or the psychological and social impact of pregnancy and birth. Previous research demonstrating that arousability and orgasm efficiency are diminished in the first 3 months after childbirth with sexual response remaining impaired for at least a year after childbirth in 40-50% of women appears to be supported by these findings.

The trend in sexual esteem, sexual depression and sexual preoccupation is interesting in that there is a sharp change in all scores at the 6 month postnatal stage. The high esteem and low depression scores found at the 6 month stage with a corresponding return to previous scores by one year, suggest that physical and life style changes may not be responsible. The change observed at 6 months may coincide with the physiological changes occurring and a return to normal, or increased orgasm intensity and frequency. However, the swing back to previous high levels of depression found at one year requires a different explanation. The exact timing of this shift and the



duration, would require a more detailed, longitudinal study with analysis points at more frequent intervals. Throughout this shift in scores, preoccupation continues to correlate with depression adding further evidence to the theory that in this population, preoccupation is associated with negative cognitions.

5.2.8 THE IMPACT OF URINARY AND ANAL INCONTINENCE ON SEXUALITY

The sexuality scale has not previously been employed to explore either an obstetric population or the impact of incontinence. Although the emotional domain was affected the most by incontinence symptoms, the relationship domain was affected the least. Given that the emotion section of the QoL domain asks questions about feeling anxious and depressed, it would be expected that an adverse effect on the emotion domain would correlate with high levels of sexual depression. If anything, the results suggest the opposite, with incontinent women reporting high impact on the emotion domain but lower levels of sexual depression. This would suggest that the sexual component of their life may be subject to psychological defence mechanisms to protect the sexual self. Further support for this theory is in the free text and disclosure responses, where respondents believed that their relationship was not affected by their incontinence symptoms. QoL scores suggest the relationship was adversely effected, all be it to a lesser extent than other domains.

Trends in sexuality scores did not differ between those with incontinence symptoms or those who were symptom free. Combined, these findings would suggest that either, the emotional impact of incontinence has no impact on the sexual self or that the incontinent group were employing self defence approaches in order to address their condition. Previous research has shown that anal incontinence does not have a detrimental impact on sexual desire or enjoyment. These findings are supported by this research.

5.2.9 THE IMPACT OF URINARY AND ANAL INCONTINENCE ON THE SELF

The psychological origins of the Self are discussed in detail in Chapter Two. To summarise, the ideas we have about our self – how we see ourselves, or the private mental image of who we are, forms our self-concept. These thoughts influence how

we feel about ourselves, or our self-esteem. If the person we are, does not live up to our expectation of the person we want to be, then esteem is low. Generally, we will behave in the way we think others expect us to (impression management). Societal norms influence and drive our behaviour. We learn what is expected of us and try to behave in a manner that meets those expectations. This process of thought influencing feeling which in turn impacts on behaviour encompasses the “I” (what we think and feel about ourselves) and the “Me” (how others see us and how we interact with them). These psychological theories may provide some insight into the findings of this research.

In an attempt to protect the self, facts may be distorted in order to meet psychological needs. Sexual depression is associated with a tendency to self punish due to concerns about capability and an ability to relate to a partner in a sexual manner. In addition, low levels of sexual esteem and high levels of sexual depression are associated with an unwillingness to discuss concerns of an intimate nature. In this research, several defence mechanisms are evident when the results concerning disclosure of symptoms are analysed. These include:

**Denial:** That is a refusal to discuss symptoms with partner or health professional. Few women discussed their symptoms and denial may be a key component of their defence mechanism. Denying the presence or severity of symptoms provides justification for non-disclosure. Many women stated that their condition “wasn’t that bad” even though analysis of their symptomology and behaviour modifications suggested otherwise.

**Emotional Isolation:** Which may involve the building of a metaphorical wall around the condition that they want to avoid facing, possibly due to embarrassment. This compartmentalisation of one aspect of their life that they find difficulty in addressing, enables the person to avoid thinking about it. Some respondents with fairly severe symptoms did not appear to be modifying their behaviour. For example, they stated that they had passive faecal incontinence all the time, but did not wear protective clothing or carry a change of clothing with them. This example could be due to a combination of denial and emotional isolation.

**Rationalization:** Symptomatic women often demonstrated rationalisation as a coping mechanism. For example, the initial excuse (its' too difficult to get an appointment, I don't want to waste their time) is supplemented by an attempt to reduce any potential disappointment (they won't believe me, they wouldn't take me seriously). These explanations of avoidance behaviour are all examples of rationalization underpinned by thoughts and feelings.

**Repression:** Repression is a cognitive process, in that it relates to thoughts. The assertion that the condition is getting better is used to justify avoiding seeking treatment. In this situation, the person may truly believe that their condition is improving, but in many cases, memory is often selective and events that may disrupt this assertion are not remembered whilst those supporting it are remembered frequently. There is evidence of repression in the replies given. Some respondents stated that their condition was improving when symptom analysis suggested a deterioration.

Some of these defence mechanisms may also provide explanations to the unexpected sexuality results. For example:

**Compensation:** It is possible, that in order to disguise the adverse impact that urinary or anal incontinence was having on their intimate relationship, respondents compensated by presenting themselves as a more proficient and fulfilled sexual partner. This may explain the increased sexual esteem and lower sexual depression found amongst the incontinent group.

**Fantasy:** It is possible that incontinent women were removing themselves from the reality of their condition and into a psychological fantasy world that they found more appealing. This may also explain the higher than expected levels of sexual preoccupation. Fantasy and compensation combined, could enable the individual to modify their thoughts about themselves, which may lead to a reduction in negative emotions such as depression and result in altered behaviour, be that general physical activity or sexual behaviour.

**Reaction Formation:** Reaction formation can be used as a self deceptive control mechanism. Feelings are reversed and so true feelings of depressions and reversed and demonstrated as happiness.

From the data available, it is not clear if any of these psychological defence mechanisms are being used by the incontinent women, or if they are genuinely experiencing increased sexual esteem and lower sexual depression than the continent group. The Sexuality Scale only provides relatively crude data on three aspects of sexual psychology; that is cognitions, feelings and behavioural dispositions. Having identified an unexpected positive correlation between sexual esteem and incontinence, and a negative correlation between sexual depression and incontinence, further study would be required using other self related measures to identify possible reasons. For example, a complex identity measurement would allow for in depth study of intervening variables and would explore this in greater depth in order to verify the underlying thoughts, feelings and behaviour.

There is clear evidence in this research that many of the self protection defence mechanisms outlined in chapter two, have been employed by those respondents experiencing incontinence symptoms. Continued use of any of these defence mechanisms can lead to over compensation and a failure to address the problem.

## **5.3 EVALUATION OF THE APPROPRIATENESS OF THE CHOSEN RESEARCH METHODOLOGY**

This research employed a mixed-method approach to address each specific aspect of the research problem.

### **5.3.1 WHAT ARE THE OBSTETRIC, MATERNAL AND FETAL VARIABLES THAT INCREASE THE RISK OF POSTNATAL INCONTINENCE?**

This first part of the research problem is essentially concerned with cause and effect or correlations. In a strict experimental approach, subjects could be randomised to receive different types of obstetric care and outcome compared. The ethical

implications of such an approach would probably render this method impractical. In addition, the variety of variables included within this area of exploration would necessitate numerous sub-studies, each with many compounding variables. The approach employed, that of a quasi-experimental design looking at events that have already happened and establishing if any correlations exist between variables, seems the most appropriate. All of the information required could be obtained with relative accuracy as variables were usually numerical. A qualitative approach would not be suited to this research question. The methodology chosen yielded the results required for analysis. Where possible, results have been presented graphically and clinical significance has been added to supplement statistically significant findings.

### 5.3.2 HOW DOES INCONTINENCE EFFECT FEMALE SEXUALITY?

Although the phenomenon being explored was a personal, psychological measure, again a positivist, quasi-experimental approach was employed. Data regarding the key variables in the study were gathered through a simple self report and a single interesting, but relatively superficial sexuality scale. This contrasts with the rich tradition in both qualitative and quantitative studies of self. The result was data on a large number of subjects, but the data remains essentially superficial. This is illustrated by the sexual preoccupation results. It is not clear from the data obtained if the subjects with high sexual preoccupation were thinking about their sexuality in a negative or positive light. A phenomenological, qualitative approach, using semi-structured interviews, might have yielded enriched data regarding the self related variables. This enrichment was compromised due to aspects of feasibility. While the Sexuality Scale is based on a cognitive-affective-behavioural model - the components of sexual behaviour are not explored in detail. The assumption is that by measuring aspects of the sexual self schema, an insight into probable behaviour can be gleaned. In order to understand the sexual psychology explored and enable the researcher to maintain an open curiosity about the phenomenon, the feasibility hurdles would need to be overcome and a qualitative approach adopted. This would need to address the problem of how to overcome the difficulty of trying to link physical and psychological variables; that is relating relatively tangible and objectively measurable events to elusive and methodologically challenging aspects of self-perception and self-report.

### 5.3.3 DO WOMEN SEEK HELP WHEN CONTINENCE PROBLEMS EXIST?

This part of the research problem used a qualitative methodology, employing ethnographic inquiry. Results were received in the main from free text responses in order to capture an understanding of the particular aspect of the respondent's life, namely disclosure of their incontinence. Some preliminary understanding of disclosure experiences was obtained from the limited literature available on the subject. Qualitative interviews could have been used to enrich the data provided and probe the underlying assumptions of the respondents. However, in this case, the level of detachment provided by open, free text was thought more appropriate and practical, particularly given the extent to which the subjects were involved in the other lines of enquiry within this research. From this free text, key categories of reasons for non-disclosure emerged. The aim of this research was to identify these categories, not to explore the accuracy of assumptions or the underlying beliefs and past experiences which influenced the subjects' behaviour. As such, the methodology chosen appears appropriate. A quantitative approach to this line of enquiry would have probably involved giving the subjects a list of possible reasons to choose from and may have influenced or limited their responses.

This research adopts a social interactionist approach, concentrating on the concept of "Self" and the stress arising from conflicting self-images, with a consequential risk of lowered self-esteem. Central to this is societies' labelling and approach to an illness or person with a specific condition. A sub-group of respondents who experience a specific condition (incontinence) and have an underlying set of assumptions (reasons for non-disclosure) have now been identified. Further research with this group utilising an in-depth interview technique or a phenomenological approach to explore these assumptions would enable a better understanding of the behaviour and underlying beliefs and cognitions to be obtained.

### 5.3.4 QUALITY OF LIFE

Although quality of life impact was not part of the original research problem, the tools used to obtain data on incontinence symptoms also provided QoL information. Health related QoL scales are generally based on the assumption that social phenomena in

relation to health and illness can be measured and compared (in the positivist tradition). As such, most HRQoL scales adopt a functionalist perspective, focusing on the activities and inter-relationships within the social and physical system such as performance of daily activities. Phenomenologists may argue that HRQoL is dependent upon the interpretation and perceptions of the individual and HRQoL scales are unsatisfactory and relatively meaningless since they can not take account of these individual interpretations. This approach has influenced the development of many recent HRQoL scales which attempt to measure, still in a positivist manner, the significance of the illness to the individual, adopting a more hermeneutic approach. The HRQoL tools used in this research were designed to measure traits based on perceived assumption of QoL and the relevance of the preset domains to all individuals. The result was data on a large number of subjects, but the data remains essentially superficial. Themes (in the form of QoL domains) were already predetermined with little opportunity for individual expression and interpretation. A phenomenological approach using semi-structured interviews or a hermeneutic open interview approach might well have yielded enriched data for this phenomenon. However, this enrichment was not pursued as the QoL impact was not a key research outcome for this study.

## 5.4 VALIDITY

The validity of the results needs to be considered in the context of the design and method. Not all women eligible to take part in the research returned completed questionnaires and it could be argued that the participants were not representative of the available population. As far as can be ascertained, the respondents were similar to the whole population in terms of obstetric and demographic variables.

Demographic variables, with the exception of birth weight, were not normally distributed. As a result, in many cases, non-parametric tests were the most appropriate for data analysis. Many previous studies of a similar nature have used multiple regression for data analysis. However, in order to perform multiple regression, requirements for a parametric test should be met, namely normal distribution. It is not clear if data from previous comparable studies was in fact normally distributed. Statistical tests employed in this research have been those appropriate to the data

characteristics. Measurements have included assessing the significance of differences between groups and also tests of correlation between variables. Data have been stratified into percentile bands and also into incremental scales for comparative purposes. In adopting this approach it was hoped that the data derived would be meaningful and have clinical and well as statistical significance. Multiple pair-wise testing results in several significance tests being carried out. Where appropriate a Bonferroni correction has been applied to yield a revised  $\alpha$  level. As discussed above, some aspects of scientific rigor were sacrificed due to ethical, methodological and feasibility constraints. However, the method employed was believed generally appropriate to address the research problem stated.

## **5.5 GENERALISABILITY**

The sample was yielded from a homogeneous population in that all women were continent prior to pregnancy and all were having their first baby. The research did not recruit women who did not understand English. Three reasons influenced this decision. Firstly, at the time of planning, the ethnic population in the area where the study was conducted was less than 2%. Secondly, funding was not available to translate all questionnaires and information leaflets into alternative languages. Finally, the sexuality data would have needed to be considered in the context of social and cultural beliefs and, as such, would not be generalisable to the results as a whole.

Results for obstetric risk factors, quality of life and disclosure are generalisable to any primiparous population. However, results relating to the psychological aspects of sexuality may be time and culture dependent and generalisability may be reduced.

## **5.6 INNOVATIONS OF THE RESEARCH**

This research is the largest to-date to explore antenatal urinary incontinence. It is one of the largest to explore postnatal urinary and anal incontinence. The same subjects were asked the same questions in both the antenatal and postnatal periods. The research design yielded detailed symptomology over time, as opposed to crude prevalence rates of incontinence. The longitudinal, prospective, repeated measures design provided a large volume of data to inform obstetric and midwifery practice, the



impact of incontinence on quality of life, disclosure of incontinence to health professionals and partners, and also, sexual psychology. As such, the research is believed to be unique.

## **5.7 STRENGTHS AND WEAKNESSES**

A key strength of this research is the design. This prospective, longitudinal cohort study provides data of urinary symptoms during pregnancy and after delivery. The correlation of symptoms over time provides increased validation for the results. In addition, as the study was prospective and data was collected at specific time intervals, recall bias is less likely than it may be with a retrospective design. Symptoms were assessed using standardized, validated questionnaires. This allowed data to be analysed in several ways: item by item, clustered subscales or domains, comparison of groups and repeated measures over time.

The research design does have some limitations. Urinary symptoms were not confirmed by urodynamic investigation but were a perception of the respondent. The aim of the study was not to measure urinary symptoms objectively but to ascertain the women's experience and perception of symptoms.

The psychological aspects of the study, namely the sexuality data, are not able to be explained by the current design. Interpretation and explanation of the findings is thus speculative.

## **5.8 DISSEMINATION**

Throughout the research, dissemination of preliminary results has been presented in both the hospital where the research took place and the supporting university. Further presentations have taken place to regional groups with a specific interest in incontinence and health related research. Data were available in a sequential manner. Initially, data on antenatal urinary incontinence was available, followed later by postnatal data. As the study progressed, the risk factors and psychological components became evident and were also presented.

Those women who participated in the study were offered a summary of the results. This offer was made initially when recruitment took place and reiterated with the final questionnaire. No women asked for a copy of the results.

Two publications in professional journals have arisen from this work to date:

Birch, L.; Doyle, P.M.D.; Ellis, R. and Hogard, E. (2006) Urinary incontinence in nulliparous women. *Nursing Times*, 102 (9), 61-65

Birch, L.; Doyle, P.M.D.; Ellis, R. and Hogard, E. (2006) Risk factors for the development of postnatal anal incontinence. *British Journal of Midwifery*, 14 (5), 309-314

Now that data analysis is complete, it is expected that this research will be disseminated at local and national conferences and results will be submitted for publication in peer reviewed professional journals.

## 5.9 RECOMMENDATIONS FOR FUTURE RESEARCH

This research has provided a wealth of data on risk factors for urinary and anal incontinence. The large percentage of women who had an elective caesarean section and developed urinary incontinence at one year suggests that factors other than those associated with labour and delivery may be contributing to a progressive increase in symptoms. Further research into possible hormonal or neurological risk factors needs to be conducted before conclusions can be drawn.

It would appear that the younger participants had a greater predisposition to urinary infection resulting in incontinence. This hypothesis has not been investigated previously and a simple research design to address this would be the routine collection of urine samples, which are already provided during pregnancy, to be tested for signs of infection in this cohort.

The urinary symptomology associated with low BMI and possible oestrogen deficit requires further investigation. There is minimal evidence currently available.

The new phenomenon of bladder emptying in labour being a critical factor in the development of postnatal urinary and anal incontinence requires further investigation and possibly neurological and urodynamic assessments. There is no comparative data currently available and given the clinical significance of this finding, further work is essential.

Qualitative research employing a phenomenological approach such as semi-structured or unstructured interviews would provide enriched data to address the sexual psychology findings of this research. These findings can not be explained without this further qualitative work. A longitudinal, repeated measures design would be necessary to explore the phenomena of reversed sexual psychology scores at 6 months postnatal, as described in this research.

Urodynamic assessment throughout the postnatal period would be required to determine if the apparent high number of “new onset” incontinence was actually a true finding or a reflection of individual perception and symptom tolerance.

## **5.10 CONCLUSION**

To conclude, there are many studies looking at postnatal incontinence. This research differs in that it has provided detailed symptomology of urinary incontinence in primiparous women, during pregnancy and throughout the postnatal year. The repeated measure design has allowed conclusions to be drawn on the progression of the condition and risk factors to be explored which, cover both the onset and deterioration of symptoms. Generally, urinary incontinence is a regressive condition. However, those with raised BMI or prolonged periods in labour without voiding are likely to suffer a deterioration of symptoms over time. Obesity is a societal issue that has received increasing publicity recently and some of the associated health risks have been highlighted. However, this new finding should be included within that information and recognised as a potential complication.

It is further recommended that women with a raised BMI who do report UI have long periods of follow-up with sequential assessment to monitor the progress of their

condition using a combination of self report and urodynamic assessment. Only then can appropriate treatment be offered. This evidence highlights that for those with raised BMI, UI symptoms increase in frequency and severity over time. It is vital that long-term follow up is continued and reassessment of the condition takes place. It is not known if reducing the BMI will improve symptoms, but where possible this would be a justified addition to standard UI treatment plans. As such it is recommended that all women with a raised BMI and UI symptoms are offered a consultation with a dietician.

Younger participants reported significantly higher rates of urge incontinence and when collated with their reported symptomology, this would suggest a higher rate of urinary infection in this group. Whilst the most likely explanation is that this is consequential to their sexual activity, this would need further exploration to be confirmed. From a practice perspective, given the long term sequelae, it is recommended that surveillance in this group is increased to improve detection and treatment of urinary infection. Urine samples are already provided and tested routinely for protein. In the under 20 years age group specifically, this urine sample should also be tested for infection, irrespective of the presence or absence of symptoms suggesting infection. The short-term cost implications of this are minimal but the long term benefits from an individual and societal perspective are considerable. The majority of current sex education includes information on sexually transmitted infections. This information tends to concentrate on vaginal infection. In the light of this evidence, it is advised that information on urinary infection is also included.

Length of time in labour without voiding has been identified as a significant risk factor, not only for the development of urinary incontinence, but also a deterioration of symptoms over time. It was also a significant risk factor for the development of postnatal anal incontinence. These findings present implications for midwifery practice, policy and education advocating an interventionist, proactive approach to bladder care during all stages of labour. Obstetric and midwifery policies should be developed to reflect this. It is recommended that women with an intravenous infusion or a large oral intake of fluid, empty their bladder at least every four hours during

labour. Should they be unable to do this spontaneously, consideration should be given to catheterisation. This finding also presents educational issues for both midwifery and obstetric personnel. Educational programmes need to be adapted in order to highlight the importance of bladder emptying, not only on obstetric outcomes as is the case now, but also on the long term morbidity that can result if voiding for prolonged periods of time does not occur.

As with previous studies an association was found between forceps delivery and increased risk of postnatal UI. However, the rates of reported UI decreased for all modes of delivery over the course of the postnatal year with the exception of the CS group. Whilst for all other modes of delivery the rate of UI decreased over time, in the elective CS group the rate of UI increased steadily throughout the postnatal year. Caesarean section rates continue to increase world-wide and local evidence indicates that the CS rate has increased from 15% to 28% in the past ten years. Increasingly, obstetricians and midwives are faced with patients who request a CS for no obstetric reason. There is a belief that it is a safe, convenient operation which carries less risk to mother and baby than that posed by labour and a vaginal delivery. Professional debate has centred on the desire to normalise birth and the possible risks of anaesthesia, thromboembolic disease or infection as a result of unnecessary surgery. However, this research provides further evidence of the long term implications of CS, that should also be added to the current debate. Women who request an elective CS need to be informed that their chance of developing postnatal UI will steadily increase over time, compared to all other modes of delivery. Whilst the current attempts to reduce CS rates, minimise intervention and promote normality in relation to birth are commendable, it is vital that a balance with safety is maintained.

Over 90% of women who sustained anal sphincter disruption reported postnatal urinary incontinence. Current obstetric practice focuses on the reported increased risk of anal incontinence for this group. Further consideration needs to be given to eliminatory processes and continence mechanisms as a whole. Routine screening for UI should be included as part of the usual follow-up for women who sustain such trauma.

The findings in this study support previous studies and suggest a degree of under-recognition or under-reporting of anal sphincter trauma leading to dysfunction. If the prevalence of postnatal anal incontinence is to be reduced, it is vital that this problem is addressed by the midwifery and obstetric profession. An appropriate strategy would include education, practical training, assessment of practice and interval monitoring of anal incontinence rates.

The impact of incontinence on quality of life domains shows clear evidence that the condition has a detrimental impact on many aspects of an individual's well being. Those women reporting intercourse incontinence had the greatest impact on QoL domains. As the emotion domain was effected to such a large extent, it is appropriate to provide emotional support in the form of counselling to all women who disclose incontinence symptoms.

Few women seek help for their condition and a number of personal and organisational factors have been highlighted which contribute to keeping incontinence both secret and taboo. Women are too embarrassed to ask their GP for help and fear that they will not be taken seriously. They believe that the condition is getting better when their reported symptoms suggest otherwise. They tell themselves that nothing can be done to help them when many treatments are readily available and effective. There is also evidence of a misconception that the condition is their own fault, as they failed to undertake postnatal pelvic floor exercises. Findings suggest that women are often reluctant to volunteer their symptoms and it is the responsibility of the health professional to pursue a line of sensitive enquiry in order to establish if a problem exists and give appropriate advice. It is recommended that midwifery and obstetric education programmes highlight the prevalence, risk factors and impact of incontinence and the reluctance of women to disclose in order to equip professionals with the skills needed to undertake this role. It is also suggested that information leaflets and posters be placed in GP practices and children's centres to highlight the facts of this condition to women, including what they should do and where they can get help locally.

It is clear that what incontinent women *think* is affecting the way they *feel* and ultimately their *behaviour*. Psychological defence mechanisms are employed to justify their inaction. Health professionals need to take this problem seriously if this combination of non-disclosure, inaction and unconscious defence is to be overcome. An appropriate strategy would involve targeting both professionals and the public and involve education, information, easy access to services and a review of current health service funding mechanisms. At present, GPs determine which services are bought from local providers. A lack of awareness of postnatal incontinence prevalence, combined with poor demand due to non-disclosure, and a desire on the part of GPs to control their own budget, means that considerable barriers would need to be overcome if a local provider wanted to set up a patient self-referral postnatal incontinence service without being financially penalised. Improved information on postnatal incontinence for GPs and the women themselves may increase reporting and thus demand. This in turn may lead to procurement of services and a more open and direct access to treatment.

Finally, the media has a role to play. Current advertising campaigns are led by manufacturers of incontinence products who portray incontinence as a common occurrence that can easily be managed by the application of a discrete pad. There is a moral and ethical responsibility on the part of these companies to inform women that they should seek medical help for their condition. The current approach encourages the veil of secrecy and condemns numerous women to a programme of concealment and self management of a condition that is often treatable.

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